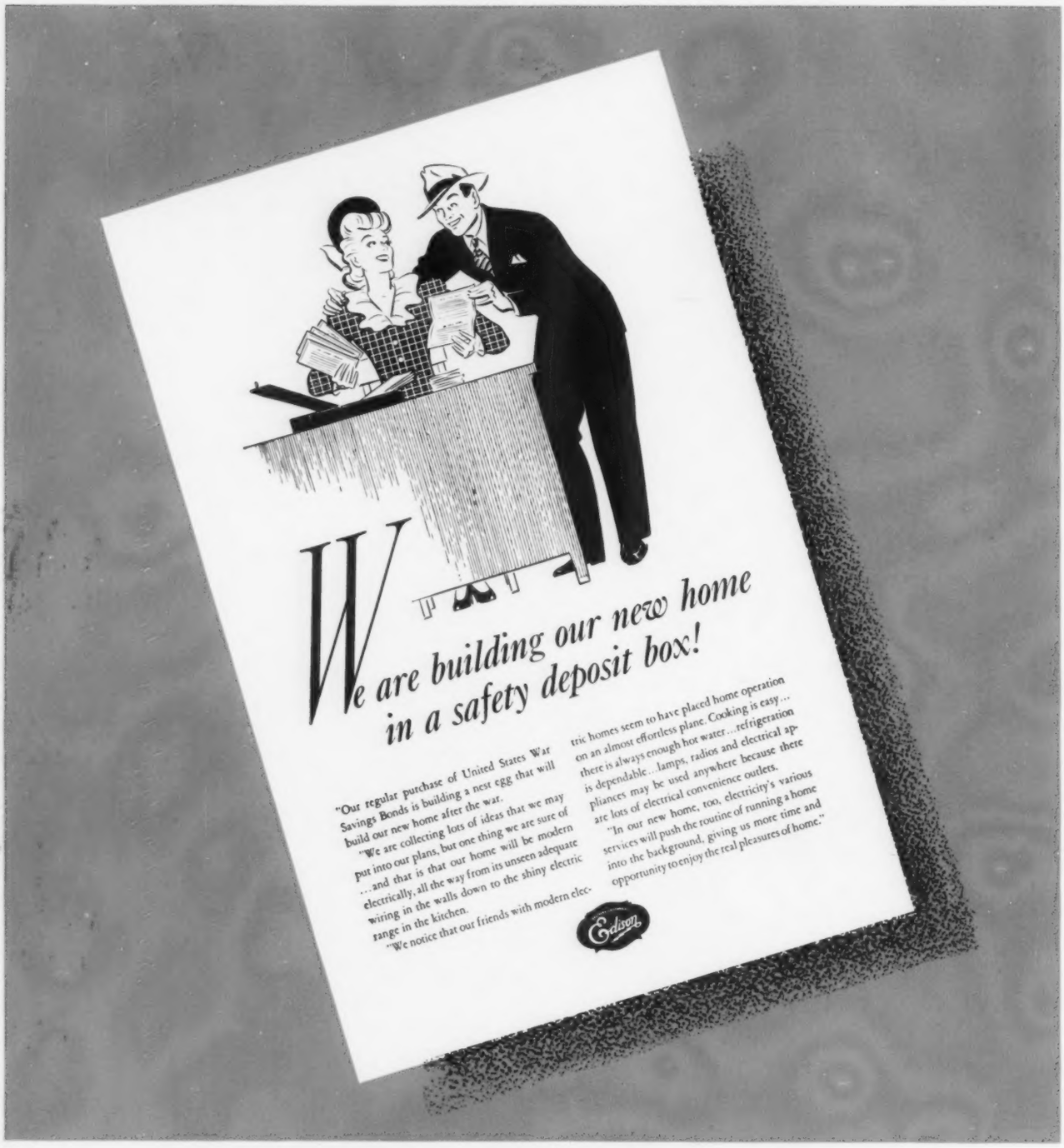
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

McGraw-Hill Co. of California

SEPTEMBER, 1942

25c a Copy


We are building our new home in a safety deposit box!
"Our regular purchase of United States War Savings Bonds is building a nest egg that will build our new home after the war.
"We are collecting lots of ideas that we may put into our plans, but one thing we are sure of ...and that is that our home will be modern electrically, all the way from its unseen adequate wiring in the walls down to the shiny electric range in the kitchen.
"We notice that our friends with modern electric homes seem to have placed home operation on an almost effortless plane. Cooking is easy... there is always enough hot water...refrigeration is dependable...lamps, radios and electrical appliances may be used anywhere because there are lots of electrical convenience outlets.
"In our new home, too, electricity's various services will push the routine of running a home into the background, giving us more time and opportunity to enjoy the real pleasures of home."
Edison

Serving the Nation and the Electrical Industry

"Buy more War Bonds today so that you may live better, ELECTRICALLY, tomorrow!" is the suggestion the Edison Company makes in this newspaper advertisement which appeared throughout Southern and Central California. Thus Edison, while serving the war effort, also serves the entire electrical industry. For the nation must be kept "electrically-minded" against the time when electrical appliances and unrestricted wiring again are available. This is a selling job every electrical dealer and contractor can be proud to help do . . . and it is a job with a future.

SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), September, 1942. Vol. 89, No. 3. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
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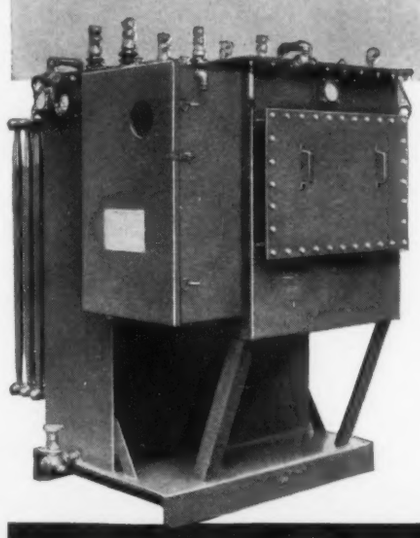
90,000 POUNDS OF COPPER*

350 MAN-HOURS*

*Savings on a typical 13.8-kv feeder by using regulators to maintain adequate voltage

You can really SAVE with voltage regulators

Three-phase step regulator



TIME—the essence of all our war effort—as well as vital war materials can be saved by regulating feeder voltage. Regulators will bolster voltage that now sags under the heavy loads, permitting more electric power to flow through circuits supplying war plants.

A recent article in *Electrical World* (page 47, Jan. 10 issue) showed the surprising savings, cited above, that can be effected by using feeder-voltage regulators instead of re-building existing power lines or adding new ones.

And remember—voltage held at correct levels means good illumination for workmen, decreases waste and spoilage, and increases the response of motorized machines. Sum total—increased production!

REGULATORS OBTAINABLE QUICKLY

General Electric feeder-voltage regulators are obtainable promptly—for voltage control on circuits from 120 to 69,000 volts. Induction and step types—oil-filled, Pyranol, air-insulated—permit choice of a regulator ***exactly*** suited to the requirements. For complete information ask a G-E representative for Catalog GEA-2762B and Publication GEA-3779.
General Electric, Schenectady, N. Y.

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

GENERAL ELECTRIC

404-29-5400

Here in the WEST

People

William G. Clary

has one ambition, to return to selling; one hobby, saleswork; one first love, selling; one vocation, salesmanship. Up to the WPB freeze he did a lot of it, after studying electrical engineering at Kansas State, serving in the Signal Corps in the last war. He rang doorbells, selling appliances in Salina, Kan., Boulder, Colo., then for the So. Cal. Edison Co. He started at Redondo with a quota of 8 ranges, sold 32. Later promoted to advance agent for cooking schools he covered the entire territory. Then he spent 6½ years under Chet Dye, as supervisor over 64 to 120 dealer cooperative salesmen for Los Angeles Bureau of Power & Light. Lately he has been with Leo J Meyberg Co.

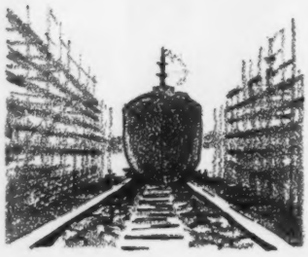
Corbett McLean

author of the article, *Capacitors Bring System Relief*, on p. 68, is assistant engineer for Northwestern Electric Co., Portland. Active in local engineering groups, he has served terms as chairman of the Portland Section, AIEE and as president of the Electric Club; has prepared technical papers for many a Northwest meeting. On the less serious side, he can tell a mighty convincing fish story; is handy with his woodworking tools (once built a 10-ft. boat for river trolling); and is an amateur photographer of no mean ability.

C. E. Baugh

who writes about simplified substations (p. 71) is assistant engineer, department of engineering, Pacific Gas and Electric Co., specializing on distribution. He is a University of California electrical engineer, class of 1915, and he is vice-chairman of the San Francisco Section AIEE. Except for one year with the Modesto Irrigation District, his entire career has been with PG and E.

Preview



Western Industry

has taken seven league strides within the last year or two. As a production region for airplanes, ships, critical metals and materials, it has surpassed the imaginative dreams of even the West's best boosters, than which there are few than whicher. If all goes well and releases are given in time by the necessary precautionary agencies, our October number will bring out from the closed gates of such western war industries such technical information as may be applied to further aid other war industries and give no comfort whatever to the enemy. Principles employed in handling and utilizing the large and varied electric loads such industries require will be discussed. Some of the methods by which the provision of facilities were expedited will be set forth for others to do likewise.

Substations

Distribution substation design, limited now by shortages of critical materials, will never be static. Seattle City Light has completed one of two new residential stations that incorporates several innovations. These are residential installations, which will include automatic air-cooled rectifier equipment for Seattle's trolley bus system. One of the new stations will be described next month.

Substitutes

Tongue twister among new substitute materials is pentachlorphenol to be used in place of scarce creosote for pole treatment against decay, termites and other causes of shortened life in wood poles. Southern California Edison Co. has performed extensive experiments with this new material and results of these tests will be published in the next issue.

Pages

This Once Bright World 43
How the dimout order on the Pacific Coast affects industry; technical problems involved in complying with the order.

Light Must Live 46
Safety and health, as well as comfort, urge that illumination be cut no more than necessary to the war effort. A pictorial section of good lighting for various uses.

War Plant Record Is Tower Per Day 65
Los Angeles Bureau of Power & Light build line to war plant in 36 working days; crane erection technique speeds tower construction.

Selling Was Fun 56
By WILLIAM G. CLARY. Fond memories of an Ex-Bell-Pusher.

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News 80

Cover photo: A military searchlight, courtesy General Electric Co.

Power where you need it... FAST!

IN AN ISOLATED PATtern storage warehouse, this 50 kva Allis-Chalmers Dry Type Transformer creates no fire hazard . . . saves valuable copper because no long secondary run is needed.

You Can Install Allis-Chalmers Dry Type Transformers Right at Load Centers ..Save Time..Space..Power..Copper!

Here's one way you can help your country's Victory Effort. And you can do it with big savings to yourself as well!

Specify Allis-Chalmers Dry Type Transformers for load center power distribution in all cases of plant expansion or conversion.

These units need no fire-proof vaults . . . slash time required for installation. If a plant is already crowded for floor space, you can mount them overhead — right at the machines they serve.

That means voltage conditions are improved. Motor and lighting performance are stepped up. And it also means you can save as high as 50% of the copper required for wiring by eliminating long, heavy secondary runs.

Equally important, your maintenance men don't have to waste their time, filtering or changing insulating liquid. Future changeovers can be made quickly because of the smaller transformers.

Allis-Chalmers Dry Type Transformers are available for quick shipment now! Contact the district office near you. Or get in touch with Allis-Chalmers, Milwaukee, Wisconsin. A 1523

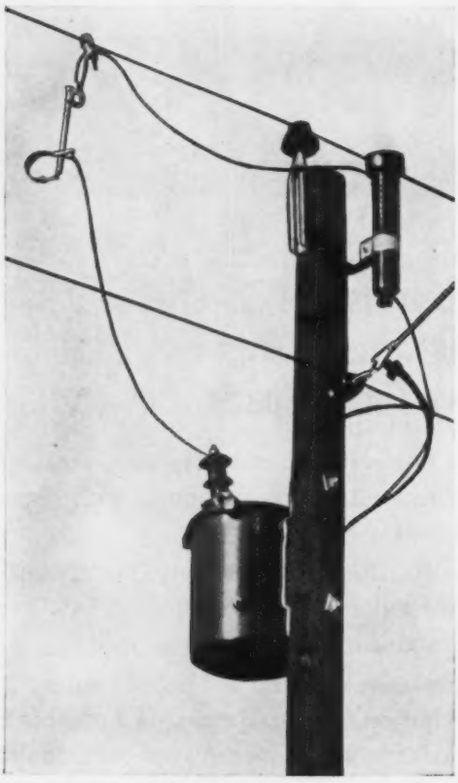
6-WAY SAVING WITH ALLIS-CHALMERS DRY TYPE TRANSFORMERS

ALLIS-CHALMERS

MILWAUKEE·WISCONSIN

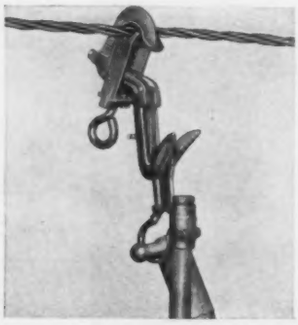
WE WORK FOR VICTORY WE PLAN FOR PEACE

CONSERVE MATERIALS—SAVE MONEY



Shows typical installation of Catalog 4881-QQ Matthews Cutout.

Shows socket clamp permanently attached to conductor and fuseholder about to be snapped into contact with ball point hot stick. Connection and disconnection can be done in less than a second.



Shows fuseholder seated in socket clamp.
Note fuseholder can't fall off ball point stick because of keyhole loop.

Catalog 4881-QQ
50 Amp.—8/13.8 Kv. Grd. Y—Int. Cap. 1200 Amp.

"Eliminate all frills in construction — include only the essentials of meeting service requirements."

. . . . . .

"Apply your ingenuity to the development of substitutes for critical materials. Find out from your supplier what items are causing difficulties and do what you can to eliminate them or find a satisfactory substitute."

Excerpts from address to Engineering and Operating Section, Southeastern Electric Exchange, St. Petersburg, Fla., September 26, 1941, by J. A. Krug, Chief Power Consultant O. P. M.

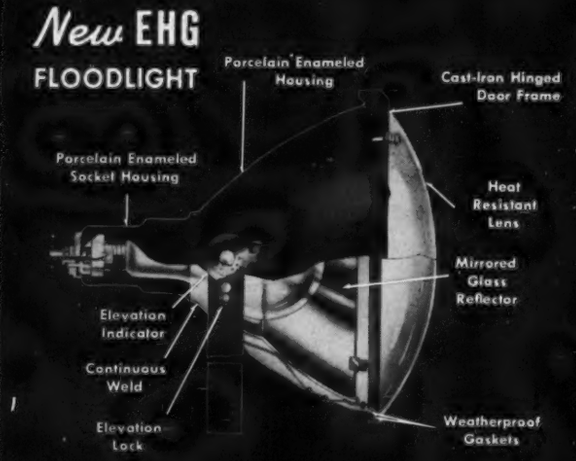
In line with Mr. Krug's statements above, we offer the Catalog 4881-QQ Matthews Cutouts as a means to effect savings in essential defense materials and shipping weights. If their ratings are within your requirements, you can save from 40 to 65 per cent of the cost of higher capacity cutouts without sacrificing operating performance.

Following are the advantages obtained in this cutout: Clamps permanently to conductor. Ball-and-Socket design permits Quick-on Quick-off without arc burning conductor. When disconnected, lead to transformer is definitely "dead," no "hot" transformer risers or jumpers. Accommodates any make of flexible cable primary fuse link up to and including 50 amperes. Patented Pullink gives visible outage indication.

Help Defense — Help Yourself — Help SPAB to help everybody, by buying Catalog 4881-QQ Matthews Cutouts during the present emergency. Perhaps you will want to use them permanently on your low capacity rural circuits after your experience with them has shown you their merits, as they have to many pleased users since they were placed on the market in 1936.

Write for Bulletin 101 and Price Sheet.

W. N. MATTHEWS CORPORATION
SAINT LOUIS, U. S. A.
ENGINEERS and MANUFACTURERS SINCE 1899



NIGHT LIFE—U.S.A.

For the safety of America's new night life, we've designed a line of all-purpose floodlights which have industry-wide applications for protecting fence lines, plant buildings and outdoor production. Lightweight and weatherproof, these new units range in size from eight inches to eighteen inches.

Westinghouse Types EHG, with universal burning lamp, and VEG, with vertical burning lamp, are constructed of sheet iron. A choice of narrow beam reflector (metal-backed glass) or wide beam reflector (porcelain enameled) with various lens and lamp combinations provides a complete range of beam spreads. Both types of floodlights have graduated, locking adjustments to facilitate aiming and relamping.

Producing these floodlights and providing complete application engineering service are all-out war jobs at Westinghouse today. The nearest Westinghouse Lighting Specialist will gladly help answer your protective lighting problems, or you may write for a new *Protection With Light Planning Book*, B-2280-A. Westinghouse Electric & Manufacturing Co., Edgewater Park, Cleveland, Ohio.

Westinghouse

Lighting Equipment

Hotpoint ANNOUNCES

Our New HOTPOINT ELECTRIC KITCHEN Is Just Around the Corner...

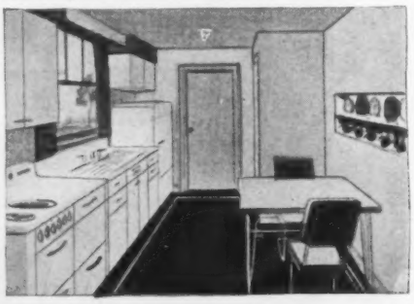
EVERY DOLLAR I spend for War Bonds gives me a great big thrill of satisfaction! I figure I'm not only helping win the war but hastening the day when I'll be able to own the kitchen I've always dreamed about—a Hotpoint Electric Kitchen like Jane's. You can't *imagine* how much actual time and work it saves her every single day—how amazingly easy it is to keep clean—how delightfully cool it always is!

. . . and Boy, It's a Beauty!

The cost of a Hotpoint Electric Kitchen averages about 10% of home-building costs.

I never realized that a practical Hotpoint Electric Kitchen could be so handsome! It's certainly a beauty—every gleaming inch of it! And best of all—it costs far less than we ever thought!

FOR A $6,000 HOME—The Colonial Kitchen (left), complete with Hotpoint Range, Refrigerator, Electric Dishwasher, Sink and Hotpoint Steel Cabinets, costs so little that many $6,000 homes now enjoy them.



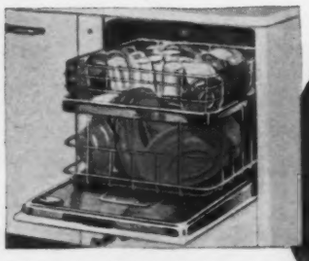
FOR A $4,000 HOME—The Sunset Kitchen (above), typical of *thousands* installed in low-cost defense homes, is equipped with Hotpoint Range, Refrigerator, Hotpoint Sink and Steel Cabinets.

BUY WAR BONDS TODAY—ELECTRIC KITCHENS TOMORROW

This advertisement in full colors, and others of similar type will appear in the following publications:

PUBLICATION	ON SALE	ISSUE
Electricity on the Farm	September 1	September
Collier's	September 11	September 19
House Beautiful	September 18	October
Better Homes and Gardens	September 25	October
American Home	September 25	October
Electricity on the Farm	October 1	October
House Beautiful Maintenance and Building Manual	October	Fall & Winter
Life	October 9	October 12
Collier's	October 9	October 17
House Beautiful	October 19	November
American Home	October 23	November
Electricity on the Farm	November 1	November
House Beautiful Guide for the Bride	November	Fall & Winter
Life	November 6	November 9
Bride's Magazine	November 15	November 15
Collier's	November 20	November 28
Better Homes and Gardens	November 25	December
Life	December 4	December 7

far longer in Refrigerator. conomy right avings we will in quantities!



● Even the children can operate a Hotpoint Automatic Electric Dishwasher and Disposall. Just a flick of the switch and dishes are washed sparkling clean—food wastes flushed away.

Hotpoint ELECTRIC KITCHENS ★ ★ ★

WEST TAYLOR STREET, CHICAGO, ILL.

AN IMPORTANT CONTRIBUTION TO AMERICA'S WAR EFFORT

...and a Plan for the Future!

OUR HEART'S IN THE WAR

BUT OUR EYE IS ON PEACE

A DOUBLE-ACTION PROGRAM

To Sell War Bonds NOW

Hotpoint's new advertising program is designed to tell the American people that the money they invest in War Bonds today renders double service. It helps Uncle Sam buy the materials of War now, and provides a fund with which buyers of bonds may finance the products of peace, after the War. It provides added incentive for buying War Bonds; gives a good reason for saving.

To Finance Post-War Purchases

While Hotpoint's facilities are converted to War production the day will come when our dealers, distributors, and customers will turn back to peace-time business. Meanwhile Hotpoint's War Bond advertising is telling your prospects and customers to buy more War Bonds with which to finance the purchase of a new Hotpoint-Electric Kitchen after the War is won.

How You Can Help—

Hotpoint's new wartime program is for you. The plan book "Maybe Tomorrow" explains every step and shows mailing pieces, newspaper advertisements and the novel Home Planning File. Ask your Hotpoint Distributor for details. This program enables you to urge your customers to earmark their War Bond Savings for Hotpoint appliances after the War.

Home Planning File

Makes it easy for your customers to file and save ideas for the home they plan to build after the War. Keeps your name constantly before them.

Washington Likes This Cooperation

Hotpoint's War Bond advertising program is doing a vital job for Uncle Sam. It gives a new dimension, an added reason why people should *buy more War Bonds and keep them.* Officials at Washington are pleased with the idea.

Follow through locally by using Hotpoint's mailing pieces, Home Planning File and newspaper ads. Uncle Sam will appreciate your effort.

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc., 5612 West Taylor Street, Chicago, Illinois

REFRIGERATORS
RANGES
WATER HEATERS
WASHERS AND IRONERS

Hotpoint

ELECTRIC KITCHENS

CLOTHES DRYERS
AUTOMATIC DISHWASHERS
ELECTRASINK
STEEL CABINETS

War- NO RESPECTER OF TOOLS

When a line must be strung—in a hurry—a soldier has no time to baby tools. Under war conditions, Klein pliers and equipment are proving the wisdom of the policy of extra quality—of added care in manufacture that has made the name of Klein synonymous with the finest in tools among linemen and electricians—everywhere. Today, as in the past, under the acid test of war, this equipment is proving to our sailors and our soldiers here and in foreign lands that, the extra quality that has characterized Klein equipment "since 1857" assures better work—performed on time.

Since 1857

ASK YOUR SUPPLIER

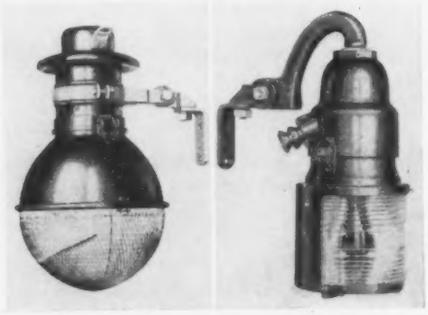
Foreign Distributor:
International Standard Electric Corp., New York

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3300 BELMONT AVENUE CHICAGO

PRODUCTS
that are news

Protective Light Brackets (900)

Two new protective lighting brackets have been announced by Line Material Co. Both are designed for pole mounting where vertical and horizontal adjustments are required and particularly for fence lighting with Fresnel lens-type luminaires.



The pendant type is available for inner or outer wiring and will accommodate the LM Fresnel and the LM Prismalite luminaires. The clamp-around type will accommodate the Fresnel and the Prismalite luminaire when used in combination with the LM Clampolite wet-process porcelain head.

Watt-Hour Meters (901)

A new line of switchboard watt-hour meters has been announced by Westinghouse Electric & Mfg. Co. These meters are available with rear connection stud terminals for use with instrument transformers or self contained up to 50 amp., and may be secured for projection or semi-flush mounting. Meters up to 15 amp. for semi-flush mounting, with the exception of two models, can be changed to plug-in type by replacing stud terminals with blade terminals. Plug-in features are provided with automatic circuit closing devices which operate when the meter is removed from the board, eliminating service interruptions during inspection and maintenance. This same device serves also to short circuit current transformer secondaries, the manufacturer states.

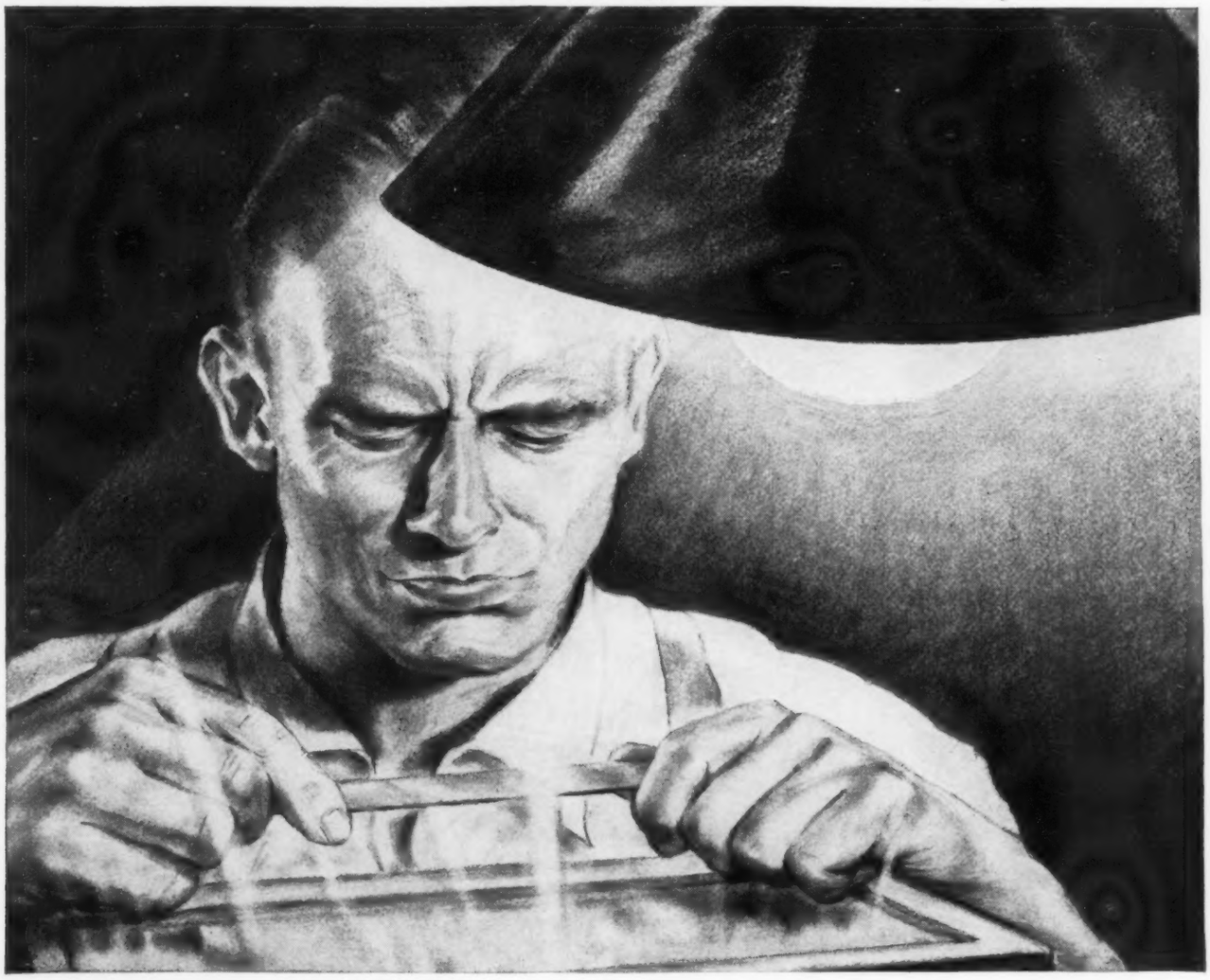
Secondary Protector (902)

General Electric Co. has developed a new Thyrite secondary protector for current transformers. This unit consists of a disc of Thyrite connected across the transformer secondary terminals, with a thermostatically operated short-circuiting switch.

When the external secondary circuit accidentally becomes opened, the secondary current will pass through the Thyrite disc. When the temperature of the disc reaches approximately 100 C, the thermostat operates the switch to short circuit the Thyrite and prevent damage from overheating. When the temperature drops to approximately 80 C, the switch opens. This operation is repeated until normal conditions are restored to the secondary circuit, when the switch will remain open.

This secondary protector can be used on current transformers operating meters or relays, the manufacturer states.

A MILLER Message inspired by WPB's helpful handbook, "Plant Efficiency."



How to save Industry from "SQUINTING SAMS"

You can help workers see clearly and sharply . . . at all times, on all jobs. Show war plants how essential adequate lighting is for fast, precision production. Give them real working *daylight* from a MILLER *Continuous Wireway* Fluorescent Lighting System.

WPB says better lighting brings these benefits . . . "1— Increased production; 2— Better workmanship; 3— Continued production by older employees; 4— Less eyestrain; 5— Reduction in accidents; 6— Better morale; 7— Better housekeeping."

In war plants from coast to coast the MILLER *Continuous Wireway* Fluorescent Lighting System is now delivering such benefits.

MILLER 50 FOOT CANDLER or 100 FOOT CANDLER will provide industry with fine, man-made *daylight* . . . adequate, productive illumination evenly distributed over every working surface. MILLER TROFFERS will duplicate that performance in plant offices and drafting rooms.

MILLER, by virtue of almost 100 years of lighting experience, working with all types of light sources . . . filament, mercury vapor and fluorescent . . . can give you exactly the lighting equipment you would like to specify for today's crucial needs, engineered to the "seeing" tasks of your customers' businesses, and constructed to effect savings in critical materials in line with WPB requirements.

A MILLER field engineer (located near you) is available to assist you in the planning of the most efficient lighting layout for each of your jobs and in every other way possible. For prompt action, write or wire us today.

BUY U. S. WAR BONDS

MILLER

50 FOOT CANDLER
100 FOOT CANDLER
MILLER TROFFERS
Continuous Wireway Fluorescent Lighting Systems

THE MILLER COMPANY
MERIDEN, CONN.
Pioneers in Good Lighting Since 1844

• MILLER offers a complete line of filament and fluorescent lighting equipment.

You can help us . . .
ROLL 'EM UNDER
ELECTRIC WIRE and CABLE REELS are urgently needed for vital shipments. One way you can help us keep 'em rolling is to return empty reels and spools as soon as they become available!
RETURN REELS AND SPOOLS PROMPTLY

SAVE RUBBER with Paper or V. C.

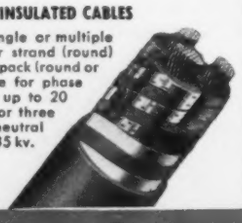
WHEN CONDUCTOR or room temperatures are high...when you get sudden voltage surges or temporary overloads . . . that's the place you can specify Roebling Varnished Cambric Insulation — conserve heat-resisting rubber for vital front-line duty.

CHECK OVER your wiring jobs where rubber was formerly specified. You'll find plenty where Roebling Paper Insulated Cable can now be used, circuits maintained without the need for priceless rubber.

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA
San Francisco • Los Angeles • Seattle • Portland

ROEBLING VARNISHED CAMBRIC CABLES
...available in single or multiple conductor, all sizes from 2,000,000 circular mils to 14 AWG in single conductor—750,000 circular mils to 14 AWG in multiple conductor.

ROEBLING PAPER INSULATED CABLES
...available in single or multiple conductor, regular strand (round) or sector) and Compack (round or sector). Belted type for phase to phase voltages up to 20 kv. Shielded type for three phase grounded neutral circuits from 13 to 35 kv.



ROEBLING
ELECTRIC WIRES AND CABLES

Air Raid Alarm Control (903)

A new air raid alarm control has been developed by the Tork Clock Co. This control is designed primarily for private use to supplement general signals where local noises or sound resistance prevent a quick and sufficient response to a general alarm.

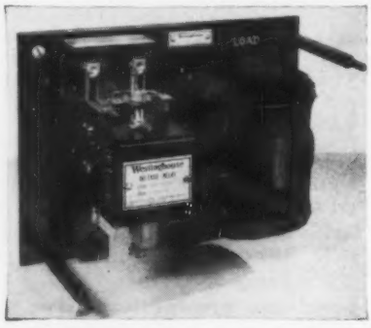
It is particularly recommended by the manufacturer for hotels, apartments, department stores, schools, office buildings, factories and industrial plants.

Tork Control No. B 42 may be used for bells, horns or sirens within its rated capacity of 10 amp. single pole, and is instantly adaptable to electrical loads of any capacity with the use of a suitable relay, the manufacturer states. The selector switch at the left is normally in the alarm position, requiring only a momentary contact of the trigger switch at the right to set the control in action, thus relieving the operator for other important duties. At the end of two minutes the alarm stops. Subsequent operations of the trigger switch will not affect the two min. cycle.

This device is synchronous motor driven and, should there be any failure of the motor to start, it may be operated manually. The standard model provides 29 intermittent signals for alarm during its two min. operating period for use with bells or horns. The intermittent schedules for sirens are made to order at the same price. An "All Clear" signal of two minutes steady operation is provided in either case. Price $37.50, f.o.b. Mount Vernon, New York.

Automatic Synchronizer (904)

A new automatic synchronizer, Type XK, has been designed by Westinghouse Electric & Mfg. Co. to provide an inexpensive device for automatically synchronizing small generators. This unit is limited to AC machines having a kva. rating of 250 or below and a voltage rating of 600 or less, with a suitable



governor and fast closing machine contactor or breaker. One synchronizer and control switch is used for opening the machine contactor coil circuit when it is held closed magnetically. If the contactor is held closed by a latch and tripped electrically the switch is used in the trip coil circuit. Available for 50-50 cycle service.

Improved Lectro-Shears (905)

Black & Decker Mfg. Co. reports that its 16 and 18-gauge Lectro-Shears have been redesigned to improve ease of handling. The No. 18 has been reduced in outer dimensions and the motor housing now forms an operating handle, thus reducing length and weight of the tool and improving balance. The larger No. 16 unit has been equipped with an improved operating handle, with an instant release trigger switch and locking pin.

CHECK THE FACTS on R&IE Products

ENGINEERING AND PRODUCTION

•

COMPLETE SUBSTATION

•

OPERATING MECHANISMS

•

DISCONNECTING SWITCHES

•

AIR BREAK SWITCHES

•

CONNECTORS

•

BUS CLAMPS

•

CUTOUTS

•

THERMO-RUPTERS

•

METAL HOUSED, ISOLATED BUS

•

AUTOMATIC THROW-OVER EQUIPMENT

•

METAL CUBICLES

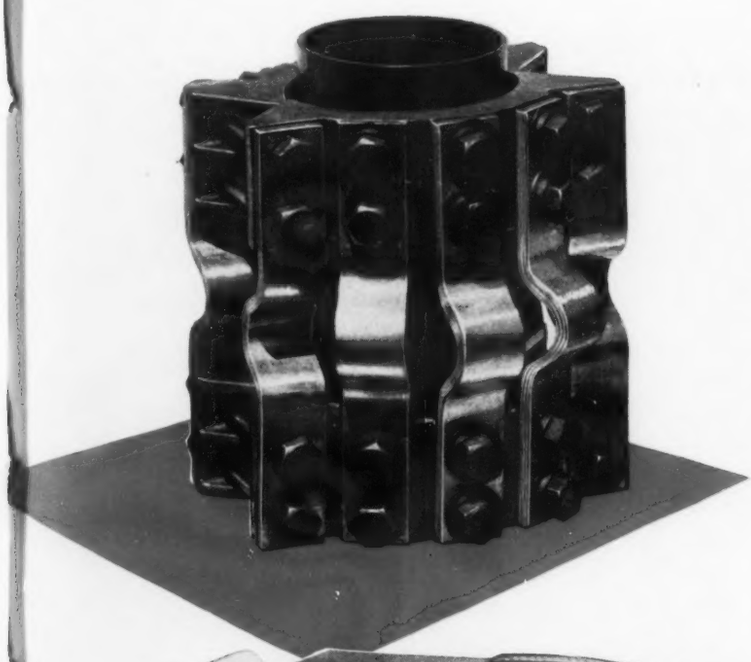
•

INTERLOCKS

•

TESTING DEVICES

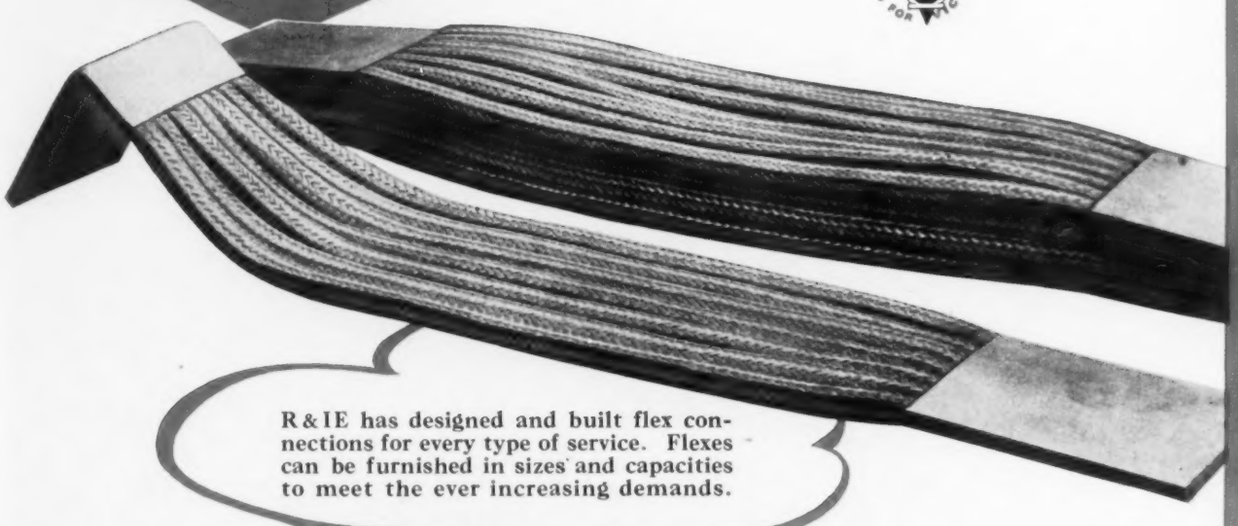
COPPER CONSERVATION



R&IE Engineers have perfected designs for flexes giving the maximum current capacity with a minimum use of copper—a vital material.

Efficient flexible connections are necessary on all heavy buses which are running at increased temperatures due to war-time demands.

VOLTS FOR VICTORY



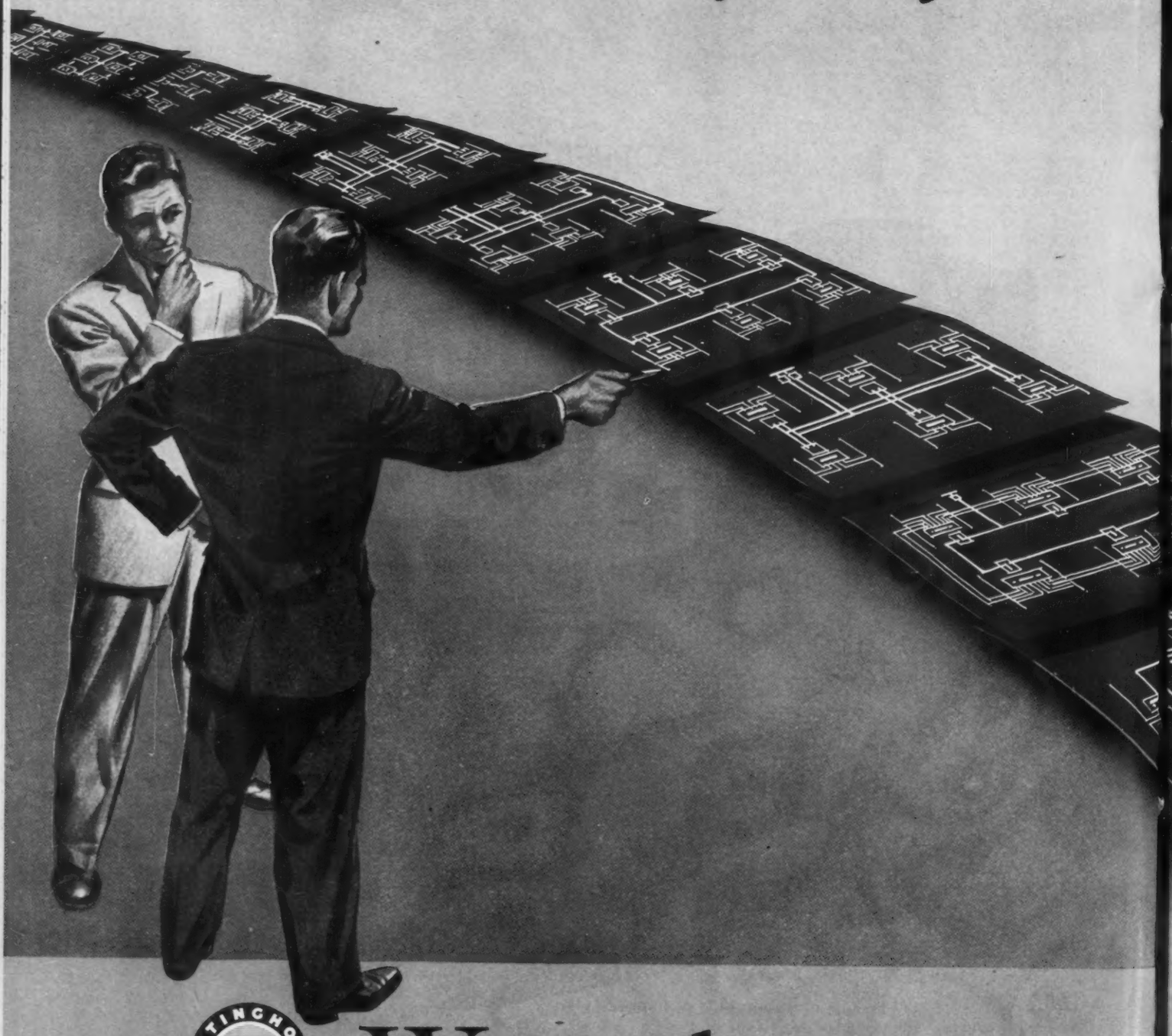
R&IE has designed and built flex connections for every type of service. Flexes can be furnished in sizes and capacities to meet the ever increasing demands.

RAILWAY AND INDUSTRIAL ENGINEERING COMPANY, GREENSBURG, PA.

IN CANADA—Eastern Power Devices, Ltd., Toronto

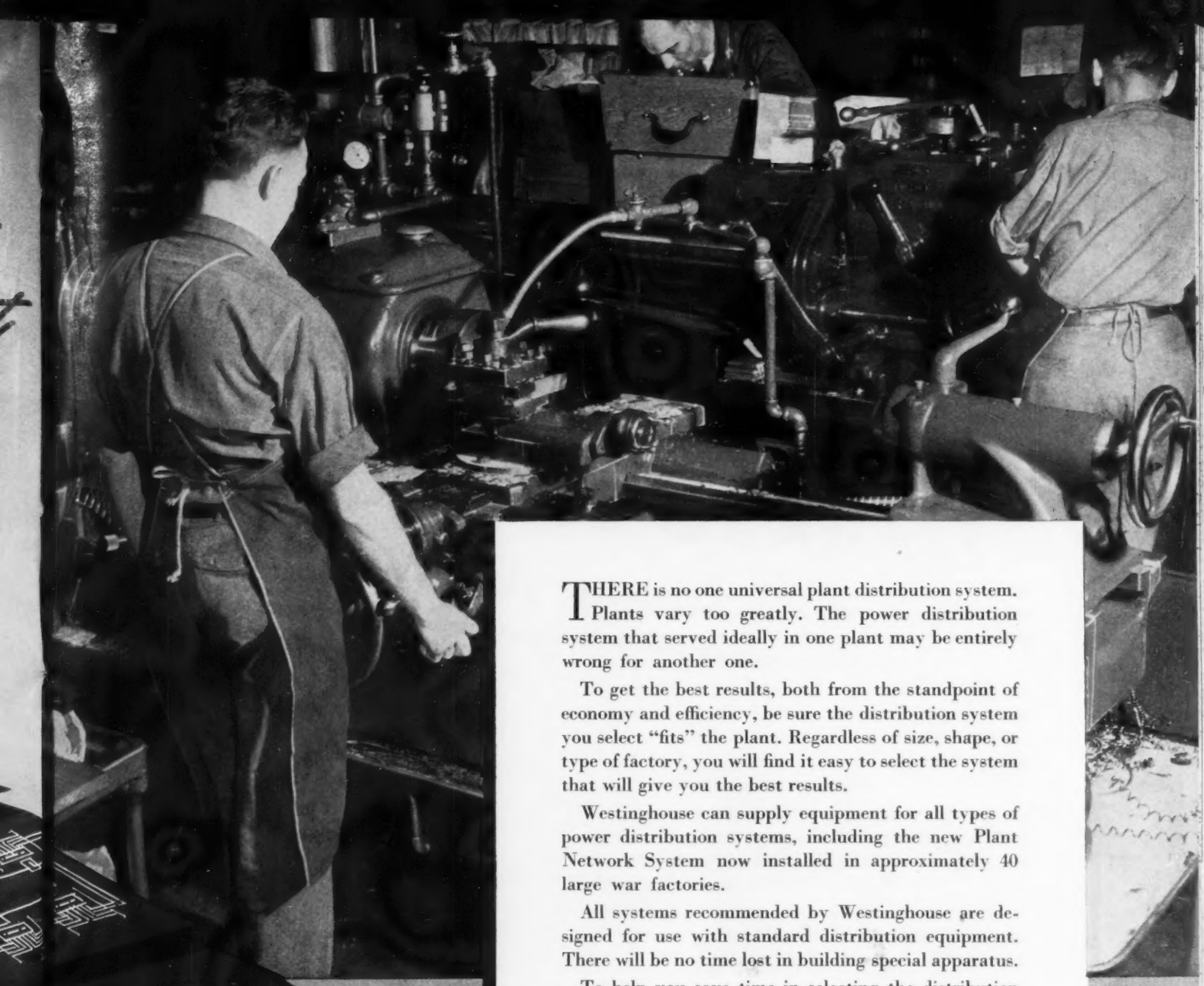
TO GET THE BEST DISTRIBUTION SYSTEM . . .

Choose the system that "fits" the plant



Westinghouse

PLANT DISTRIBUTION SYSTEMS



THERE is no one universal plant distribution system. Plants vary too greatly. The power distribution system that served ideally in one plant may be entirely wrong for another one.

To get the best results, both from the standpoint of economy and efficiency, be sure the distribution system you select "fits" the plant. Regardless of size, shape, or type of factory, you will find it easy to select the system that will give you the best results.

Westinghouse can supply equipment for all types of power distribution systems, including the new Plant Network System now installed in approximately 40 large war factories.

All systems recommended by Westinghouse are designed for use with standard distribution equipment. There will be no time lost in building special apparatus.

To help you save time in selecting the distribution system that best fits your requirements, Westinghouse has prepared a special book that briefly describes a group of different plant distribution systems. Just fill in and mail the coupon for your copy.

If you want faster action, call our local office. One of our engineers will be glad to discuss your distribution problem with you.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

FREE QUICK FACTS ABOUT PLANT DISTRIBUTION SYSTEMS

Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

Please send book B-3152 giving quick facts on Westinghouse Distribution Systems.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____ J-94511

San Francisco, Calif., General Electric Supply Corporation salesmen, like salesmen for other G-E distributors everywhere are always busily engaged in helping customers. Here Donald H. Noble (left), ship fittings specialist, C. C. Johnson (center), and S. W. Pors (right), are checking materials needed by their customers for rush jobs.

The G-E Wiring Materials Distributor Near You Is

EAGER TO COOPERATE with You in Aiding the War Effort

G-E district representatives help distributors serve customers. Here G. Garcia (center), manager of the Oakland, Calif., General Electric Supply Corporation house is looking over samples of small boat cables suited to customers needs with J. J. Burns (left), and J. A. Mangan, G-E representatives.

W. M. Stronge (center), salesman, General Electric Supply Corporation, Oakland, Calif., is here selecting wiring devices for rush delivery to customer. Behind counter helping him are H. F. Saxton (left), at register and G. R. Warfield (right), at price book.

Bring your wiring problems to the G-E Wiring Materials Distributor in your territory. These distributors are located at key points all over the United States. They like to give friendly service and to help their neighbors in every way they can.

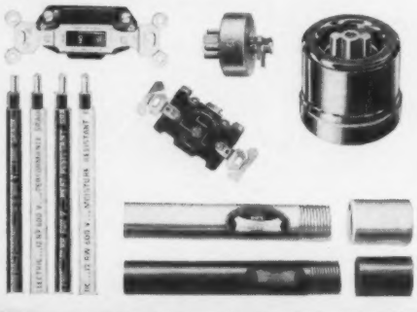
Right now the G-E Wiring Materials Distributor in your territory will be glad to help you in aiding the war effort . . . give assistance in the selection of materials for war projects . . . make wiring suggestions . . . help plan lighting improvements. Information on materials suited to maintenance needs will also be given gladly.

The materials handled by G-E Wiring Materials Distributors are sure to meet your needs. These materials include high quality conduits, boxes and fittings, wires and cables and wiring devices. They are suited for all kinds of war wiring jobs.

The G-E wiring materials field force is divided into geographical districts in order to provide greater help for distributors and their customers. Here is J. O. Dillingham, manager of District No. 6. His headquarters are in San Francisco, Calif.

G-E WIRING MATERIALS

See the G-E Wiring Materials Distributor serving your territory for detailed information about G-E conduit, wire and cable and wiring devices for your special requirements. Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.



GENERAL ELECTRIC

Equipped with special induction motor, quiet fan and heavy duty switch for cool fan, half-heat, and full heat. 8 feet cord, 230 Volts—50 or 60 cycles A.C., Single Phase. Sizes 2000 to 5000 Watts.

Smaller size equipped with special induction motor, quiet fan, and heavy duty switch for cool fan and full heat. Other features the same as the model on the left. This small heater is ideal for office use.

EMERGENCY HEAT FOR WAR PLANTS

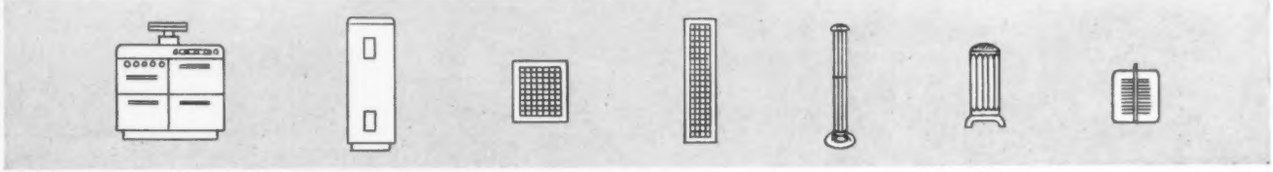
Cold spells ahead! Install Thermador Built-in or Thermador Portable electric fan-type heaters now. (Available on priority ratings of A-1J or better.)

Master Duty Fan-type Wall Heater equipped with four-position switch. Sizes 2000 to 5000 Watts. Special induction motor and 16-blade fan. Thermal protection device.

Unit heater directs the air as desired. Sizes 3000 to 8000 Watts with 10,245 B.t.u. per hour on the 3000 Watt size to 27,320 B.t.u. per hour on the 8000 Watt size.

THERMADOR

THERMADOR ELECTRICAL MANUFACTURING CO.
5119 So. Riverside Drive • Los Angeles, California



. . . WITH THE HELP OF YOUR
GraybaR LIGHTING SPECIALIST

Lighting of the highest SEEING QUALITY can be simpler than you think. The basic requirement is that it be correctly chosen to fit the visual task with adequate provision against glare and shadows.

The GRAYBAR Lighting Specialist can help you "light up" for war work in a way that's simple and practical under present conditions. Whether your need is for fluorescent or incandescent, direct or indirect, indoors or outdoors, he has the facts on what's available and the experience to see that it's correctly applied.

To take advantage of this or other specialized GRAYBAR services on signaling, power apparatus, and the like, just call your local GRAYBAR office.

WHY HIS RECOMMENDATION TO YOU MAY BE

Silvray

SPEED-LIGHTS

SILVRAY SPEED-LIGHTS are the SIMPLEST source of lighting of high seeing quality, thanks to the light control principle of the silvered-bowl lamps.

The reflector-hood serves as a self-contained ceiling, making possible efficient redirected lighting regardless of ceiling construction.

Widely applicable to present outlet spacing, using 150-200-300-500 or 1000 watt silvered-bowl lamps.

Executive Offices: GRAYBAR BUILDING New York, N. Y.

GraybaR

IN OVER 80 PRINCIPAL CITIES

Everything Electrical . . . THAT IT TAKES TO WIN!

Electronic Voltage Regulator (906)

A sensitive electronic device which regulates the output voltage of AC and DC generators with output voltage of more than 46 volts is being manufactured by Westinghouse Electric & Mfg. Co. Known as the DT-5, the unit

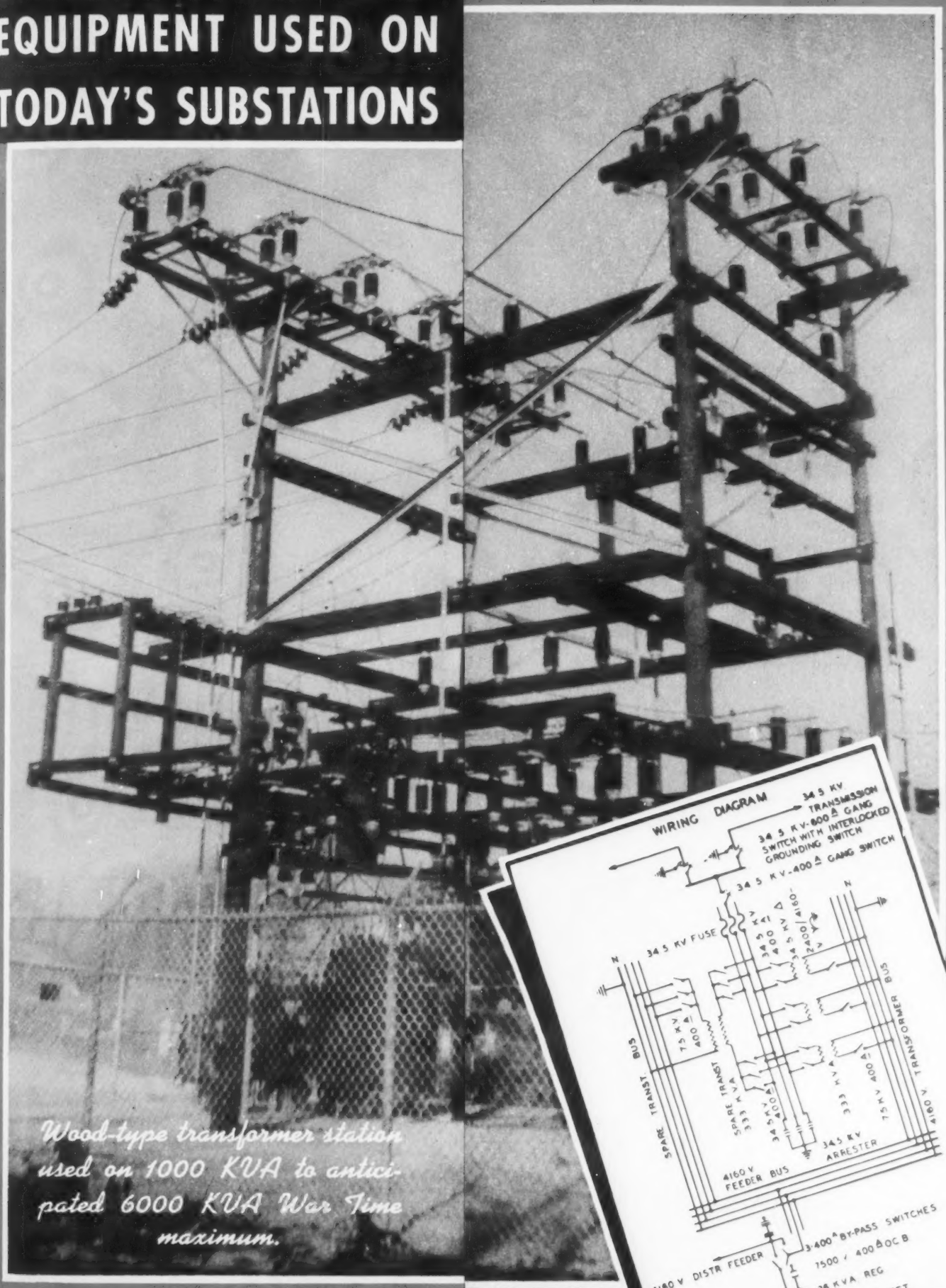
operates from a 3-phase AC power supply and acts as a grid-controlled rectifier to supply the DC field current to the generator, or the exciter of the generator, being regulated. Sensitivity is plus or minus ¼% when AC supply voltage does not vary more than plus or minus 5% from nominal rating, the manufacturer claims.

Outdoor Disconnect Switch (907)

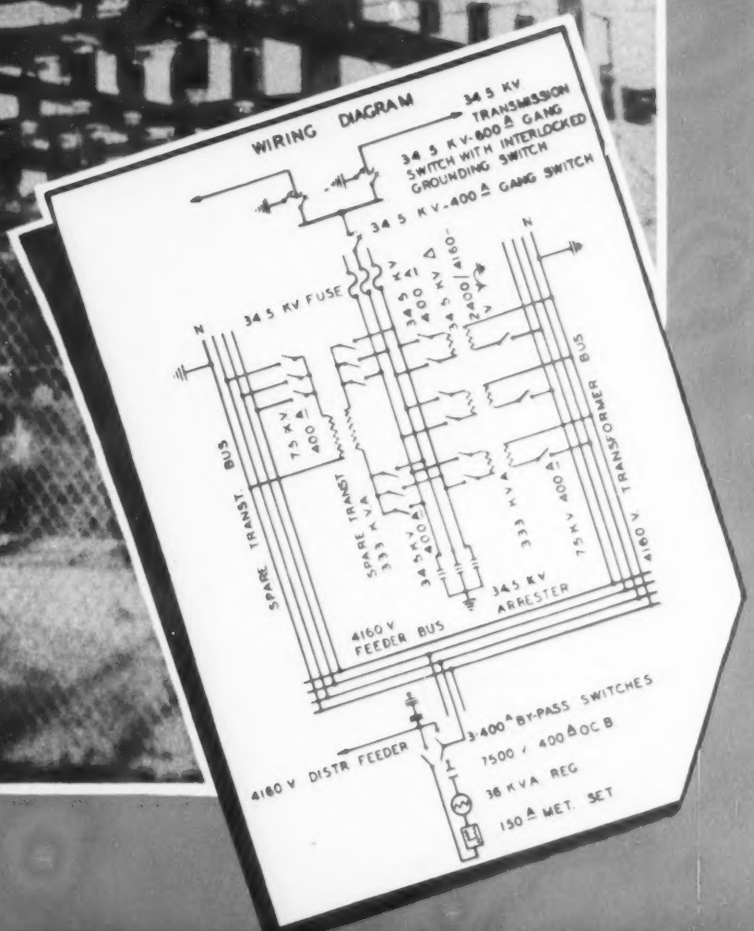
A new 3,000 amp. 7.5 kv. outdoor disconnect switch, Type "FB-2P," has been announced by Delta Star Electric Co. It is mounted on 5 in. bolt circle heavy-duty brown glaze NEMA standard insulators. Assembled for inverted mounting, it can be arranged for vertical mounting if desired, the manufacturer

states. A combination hook stick ring, positive safety lock and pressure releasing device is mounted at the contact end of the blade to insure easy opening. Straight line current path and elimination of castings for current carrying parts are features listed by the manufacturer. Made in all ratings from 2,000 amp. and in voltages up to 34.5 kv.

WITHIN THESE PAGES EQUIPMENT USED ON TODAY'S SUBSTATIONS

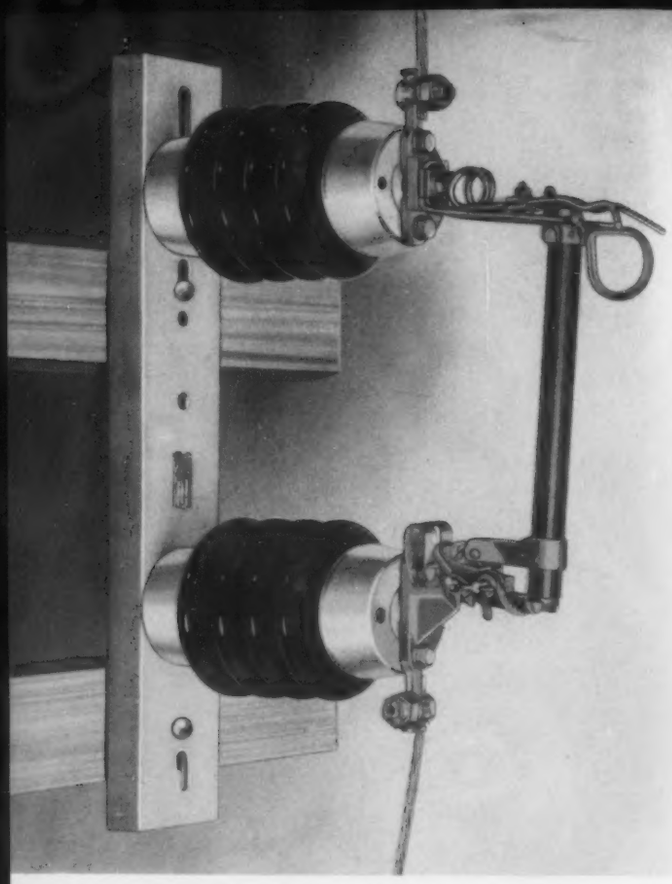


Wood-type transformer station used on 1000 KVA to anticipated 6000 KVA War Time maximum.



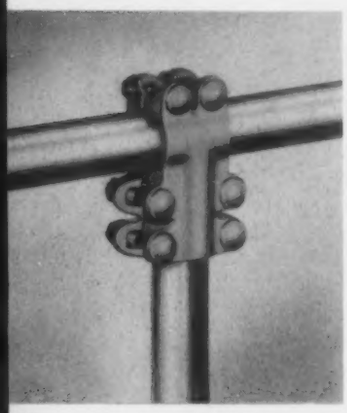
Inside information inside!

SPLIT-FOLD INSERT PAT. APPL'D FOR



KEARNEY TRIP-OUT FUSE SWITCHES

KEARNEY Trip-Out Fuse Switches are available in a full range of capacities — time and field-tested to assure dependable service, and to operate as positively on low overloads as they do on heavy short circuits. In either case, the cartridge disconnects from the electrical circuit and leaves energized parts safely separated by an ample air gap.



IN THE SUBSTATION LINE

CONNECTORS

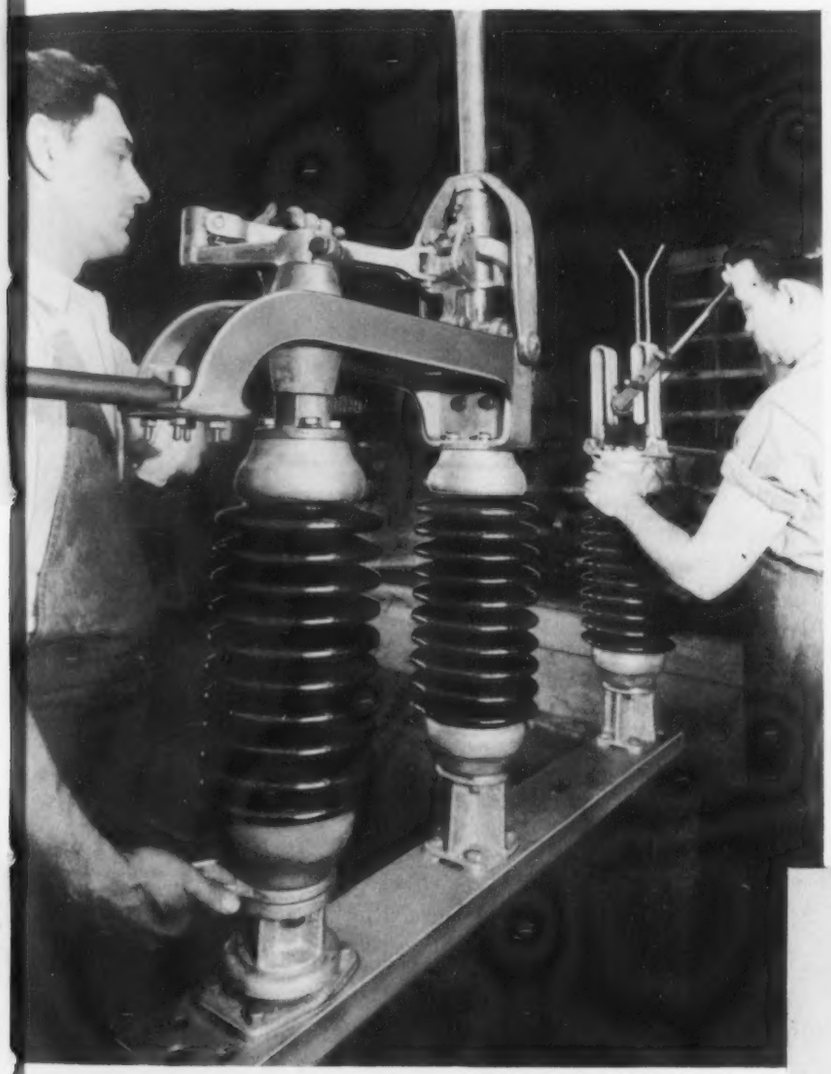
Whether it's a Branch Connector, Terminal Connector, End Connector, or special adaption, get what you need by consulting pages 26 through 68 of the Kearney Substation Bulletin No. 316.

FITTINGS

For Outdoor or Indoor Bus Support Insulators, Flat Bus, Hollow Bus, Compartment Bus, or Round Bus Support Fittings, see pages 5 through 25 of the Kearney Substation Bulletin No. 316.

FOR BETTER MAINTENANCE and CONSTRUCTION—

Here's Kearney Aid to Operating M
Seeking Suggestions and Equipment for Today's Substation Jobs



THE PHOTO and diagram on the front page of this insert comes probably as a timely suggestion . . . It has been of help to a number of operating men who were suddenly called upon to provide greater flexibility of operation and adaptability to handle increased load and additional circuits. Various Kearney Products shown on this page, modernized to meet today's needs, may be just what you need to meet changing requirements.

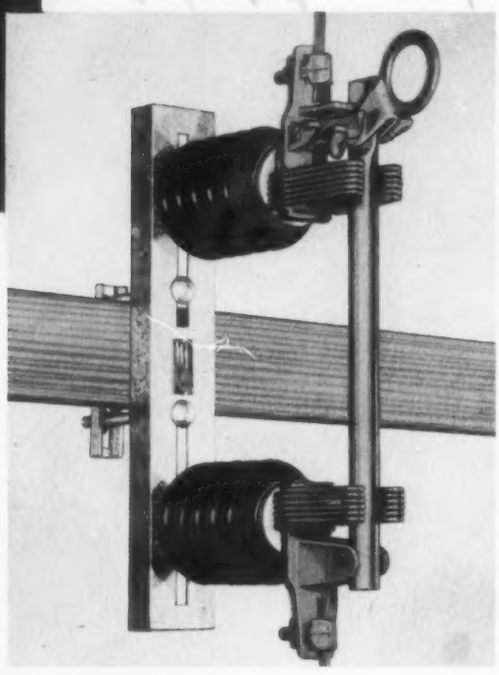
To operating men, here's a promise of Kearney aid for suggestions and equipment. The Kearney Engineering Department is always ready to work with you. Kearney designed products — those here shown, and all the rest in the Kearney Line, are built to give you satisfaction, guaranteed service. We're ready when you're ready to give Kearney aid. Ask a Kearney Representative for information, or write for service.

PRECISION-BUILT FOR HEAVY DUTIES

Kearney Gang Operated Switches are precision built to handle the heavy duty jobs imposed on equipment today. They are carefully designed, too, with new and improved features — sleet breaking action, multi-point flexing contacts, heavy cross section and other desirable features of mechanical and electrical design, necessary to dependable and long-lasting performance. Write for information about Kearney Gang Switches, available in ratings of 7500 to 115,000 volts; 400, 600, and 1200 amperes.

POINT PRESSURE ON DISCONNECTS, TOO

Provided with a tubular blade and flexing, multi-point pressure contacts, Kearney Hook Operated Disconnect Switches, such as shown at right, assure easy and positive operation. These switches are available in ratings from 7500 volts, 200 amperes, to 69,000 volts, 1200 amperes. These switches, of sturdy construction, are used for general distribution use, even in heavier substations. For information about other types of Kearney Disconnects, ask a Kearney representative — or write direct.



Use KEARNEY PRODUCTS

to Operating Me
and Equipment
ion Jobs

THE PHOTO and diagram on the front page of this insert comes probably as a timely suggestion . . . It has been of help to a number of operating men who were suddenly called upon to provide greater flexibility of operation and adaptability to handle increased load and additional circuits. Various Kearney Products shown on this page, modernized to meet today's needs, may be just what you need to meet changing requirements.

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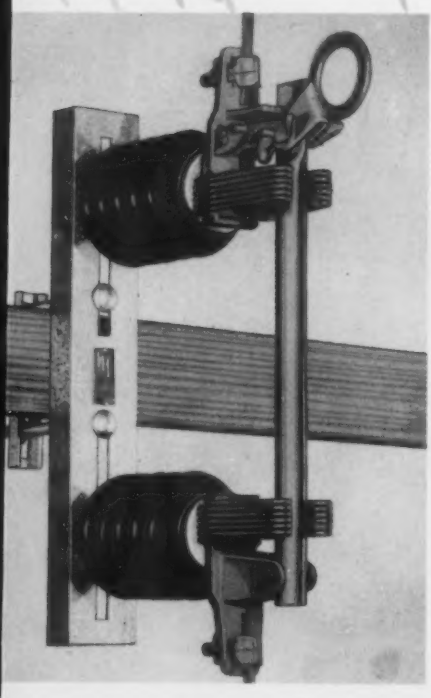
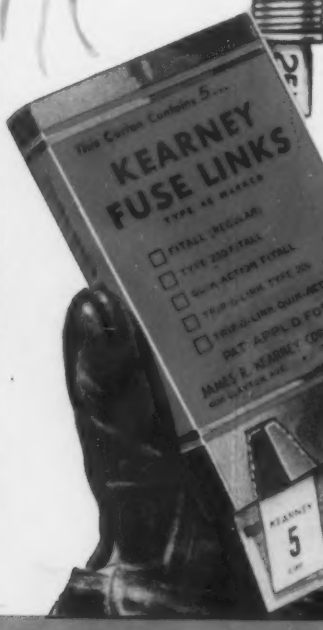
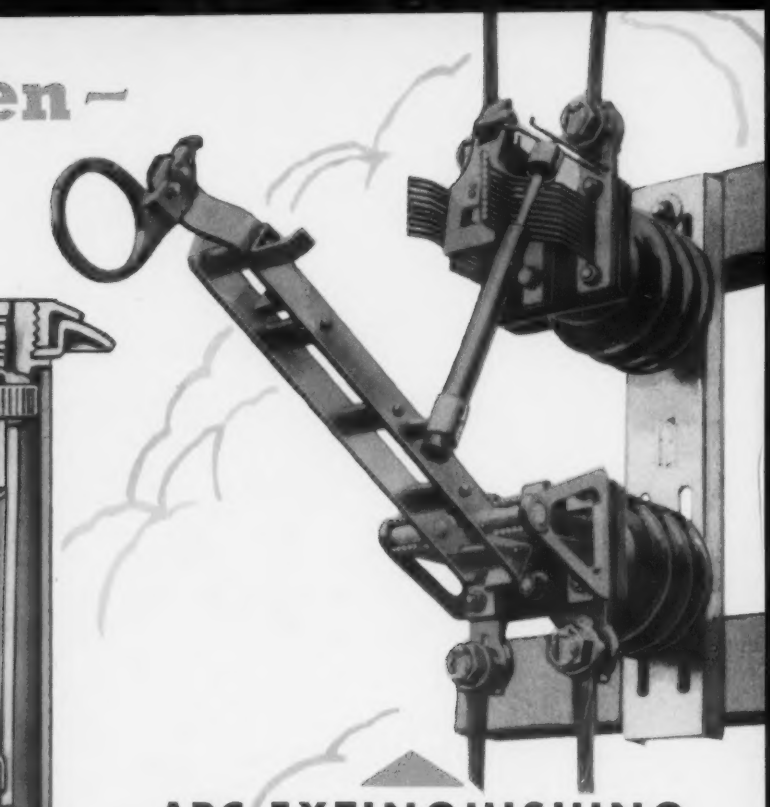




PRODUCTS-



ARC EXTINGUISHING BY-PASS SWITCHES

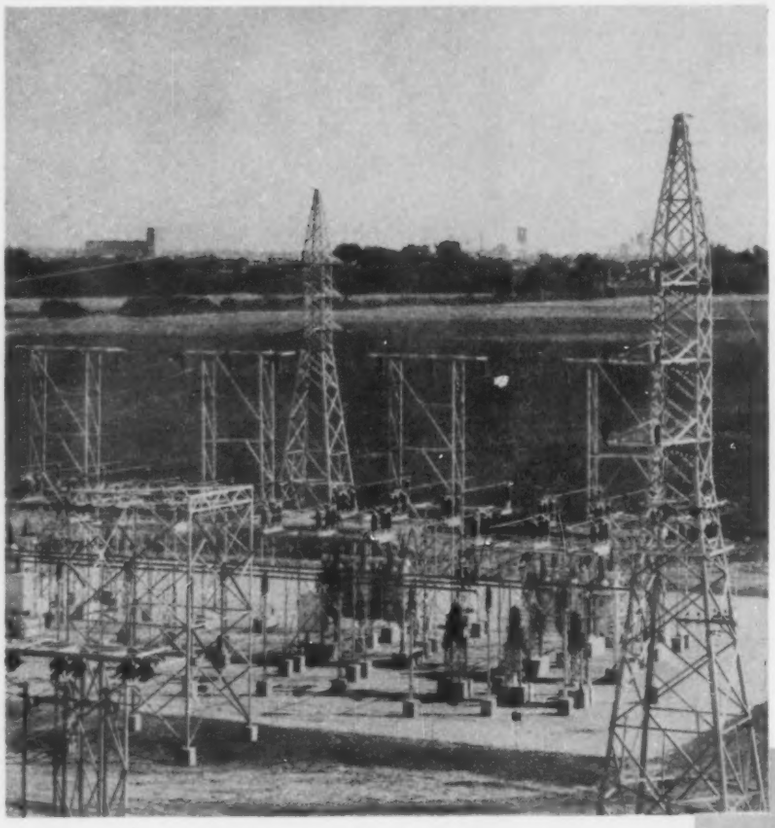
Above is a Kearney By-Pass Disconnect Switch equipped with an auxiliary arc extinguishing switch. By this means, the exciting current is interrupted after the main switch blades are open, and no additional circuit opening means is required. This action is shown above on a 15 KV, 4000 ampere, Kearney No. 8834-1 Regulator By-Pass Switch. Disconnect blades are separated from top contacts. Arc Extinguishing Switch is about to break exciting current.

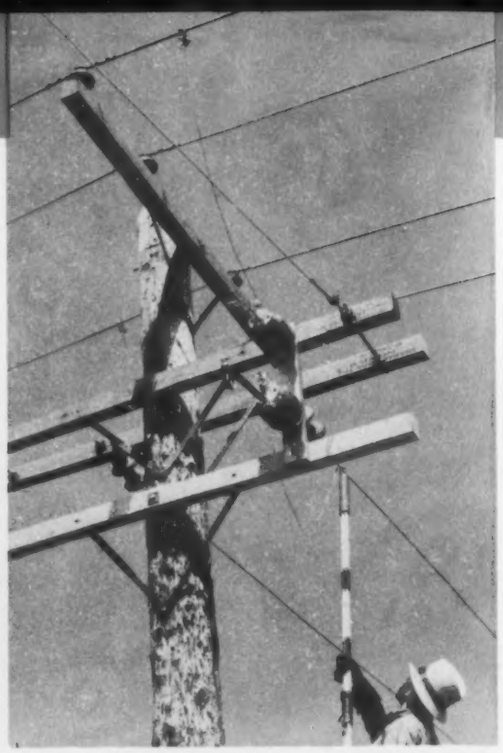
Reasons Why You'll Like Kearney Fuse Links

So that you may obtain maximum service from Kearney Fuse Links, great care has been exercised in offering you specific types and sizes, particularly designed to meet particular duties . . . And so that you may quickly and accurately identify proper fuse links for intended purposes, Kearney Fuse Links come to you in handy Pul-Tab Fuse Paks. All links are packed in individual bags with amperage ratings printed on tabs — quick to identify — quick to use without tangling or waste. Try them.

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVE. - ST. LOUIS, MO.
Canadian Plant • Toronto, Canada

SEVERAL KEARNEY AIDS FOR DEMANDS OF TODAY

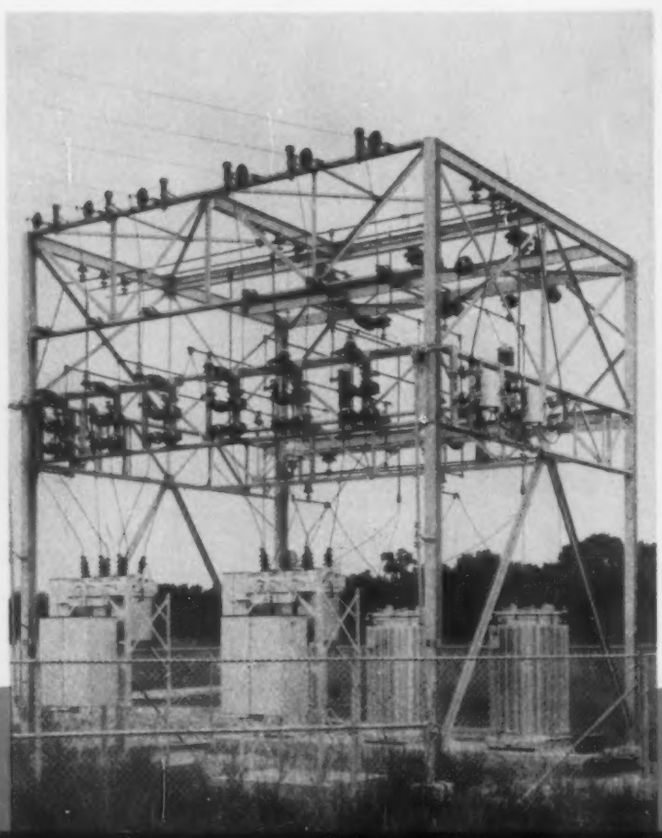


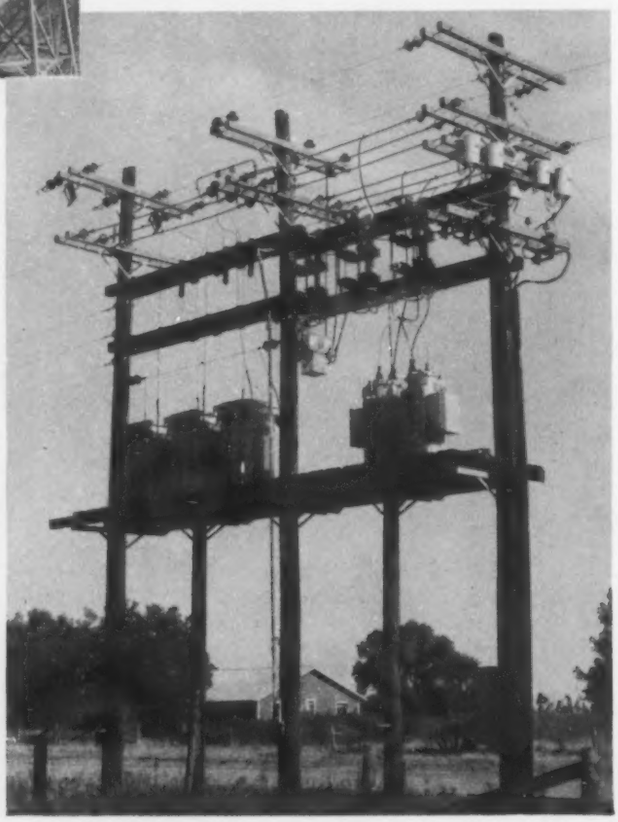


HIGH SHORT CIRCUIT VALUES require No. 8829, 15 KV, 100 ampere heavy duty Kearney Trip-Out Fuse Switch. These heavier types of Trip-Out switches must be used on high capacity circuits, even though tap or transformer capacity is low.

STURDY EQUIPMENT is a good investment on important substations and lines which must carry maximum loads these days. Kearney Rotating Insulator Gang Operated Switches play a vital part in the dependable operation of the high voltage substation shown above.

OPERATING SAFETY is assured on this distribution substation, by the application of No. 10260 Kearney OCB By-Pass Switches to the substation unit shown below. By-passing units are gang operated by manual mechanisms, disconnect blades are hook operated.





ON WOOD STRUCTURES space is conserved and operating safety and convenience is assured by the use of Kearney OCB By-Pass Switches. Their use and application isolates all leads and equipment below the upper switch insulators and thus insures safety during periodic inspections and maintenance.

Now Look Inside These Pages . . .

SEE INSIDE OF INSERT FOR MORE AIDS

F Lamp Starter (908)

General Electric Co. has announced a new manual-reset fluorescent lamp starter which locks dead lamps out of the circuit, thus allowing instant dead lamp replacement. Called the "Master No Blink", the starter is available at present for 40 and 100-watt lamps.

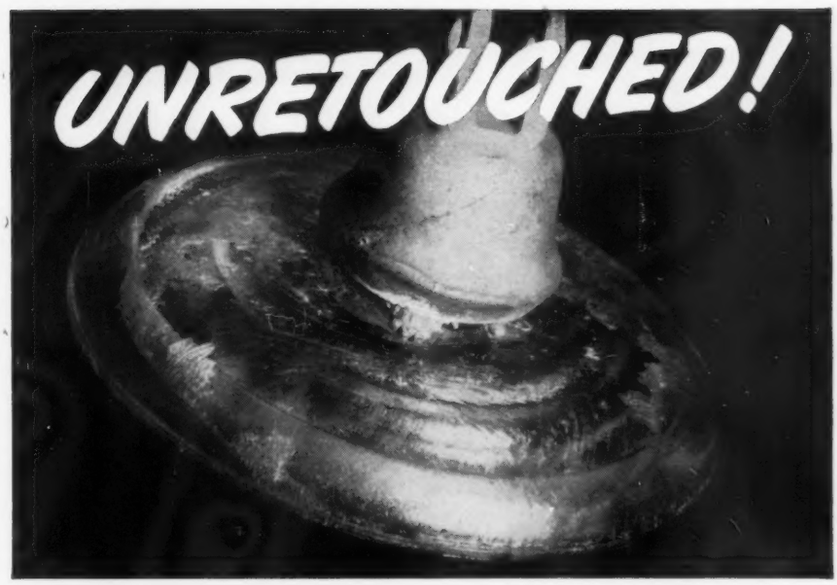
An advantage claimed by the manufacturer for the manual-reset starter is the fact that no current flows through the ballast after the dead lamp has been locked out. This current cut-off feature prolongs the life of the ballast and eliminates the "cooling" period which is required for replacement of lamps using automatic starters, the announcement states.

When the new starter locks a dead lamp out of the circuit, a small red button on top of the starter snaps forward. When the worn-out lamp is removed from the fixture, the red button is pushed in manually to reset the starter without removing starter from fixture.

Steel Floodlight (909)

A steel floodlight offering a choice of three reflectors is being manufactured by General Electric Co. Reflectors include a chromium-plated unit for narrow beam width; a painted steel unit for wider beam widths; and an internal silvered glass unit that is said to be 10 to 35% more efficient than metal reflecting surfaces.

Cast iron is used for the socket housing and an asbestos gasket between reflector and housing keeps the floodlight dry. Accommodates 750, 1,000 or 1,500-watt general service lamps.



WHAT would *your* insulators look like after 3700 amperes hit them? This unretouched photo shows a "Pyrex" suspension insulator after a 3700-ampere power arc was held directly on it by arc shields for one full second's duration!

What happened? As you can see from the candid photo . . . practically nothing! The only effect of this intense arc on the glass was a superficial crazing . . . the creation of a very thin layer of cracks on the surface. The body of the glass remained as sound as ever . . . and the "Pyrex" insulator could have gone right into service!

This is added proof that Pyrex brand Insulators maintain their efficiency under the toughest kind of operating conditions. Maximum performance and minimum maintenance cost are assured. And remember . . . you save on initial cost to boot!

BETTER PERFORMANCE . . . AT LOWER COST

SAVE ON INITIAL COST AND INSTALLATION

"PYREX" 10-in. Insulators are now 8 to 13% lower in price than competitive 10-in. units.

"PYREX" 9-in. Insulators are now 17 to 21% lower in price than competitive 10-in. units.

Stable one-price-to-all basis. Fewer than ½ as many price changes for "PYREX" Insulators as for competitive units in past 5 years.

Installation of "PYREX" strings with patented hinged crate is speedier. High M & E strength of "PYREX" Insulators usually makes double stringing unnecessary.

SAVE ON PERFORMANCE AND MAINTENANCE

"PYREX" 18,000-lb. suspension units duplicate the performance of 25,000-lb. competitive units. And in M & E tests at 25,000 lbs. and higher, 95% of breaks are in hardware, not in glass.

No "PYREX" Insulator has ever been reported to us by users as having failed from electrical causes alone.

A recent independent analysis indicates "PYREX" Insulators will eliminate ⅓ of all failures (electrical and mechanical).

Pyrex Insulators
BRAND

Corning Glass Works
Insulation Division
Corning, N. Y.

Please send me my FREE copy of "The Dielectric Strength of Glass."

Name .....

Firm .....

Address .....

City and State .....

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works

SOLVED

these tough wet and hot lube problems!

1. WET AND HOT RUNNING BEARINGS
2. CONVEYER BEARINGS
3. GENERATOR AND MOTOR BALL BEARINGS
4. IDLER BEARINGS

Have you a *tough* lubrication problem where grease must resist *both* heat and water? Then Unoba—Union's remarkable barium soap grease—will solve it.

UNOBA RESISTS BOTH HEAT AND WATER!

Ordinary sodium soap greases resist heat, but not water, while calcium soap greases resist water, but not heat. That's why Union engineers developed Unoba—*a barium soap grease.* It resists *both* heat and water—stands up under the toughest wet and hot-running conditions.

TEST UNOBA YOURSELF!

First, be sure to clean any parts to be lubricated, so that none of the old calcium or sodium soap base grease remains. Second, test Unoba by giving it your toughest lubricating problem. See if you don't find it's the best all-round lubricant you've ever used.

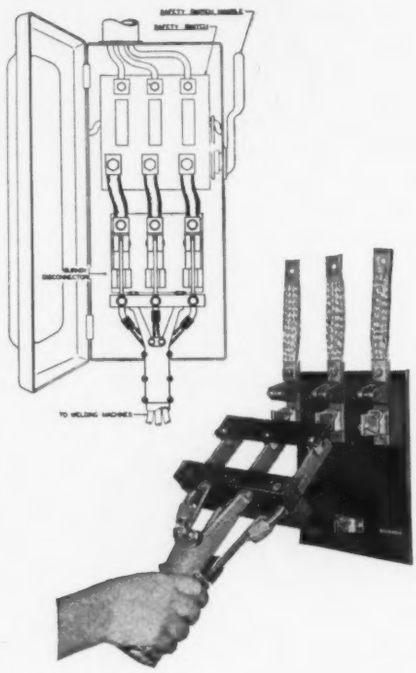
Call your Union Oil representative today! Ask for Unoba—the grease that resists *both* heat and water.

UNOBA
an industrial product of
UNION OIL CO.

OIL IS AMMUNITION—USE IT WISELY!

Burndy Disconnector (910)

Burndy Engineering Co. has developed a disconnector which it claims is "foolproof" for use in shipyards where three or four welding machines are mounted on a single frame with one cable running over the side of the vessel to a safety switch. This disconnector can be made to accommodate 3 or 4-conductor cables. It is mounted inside the box of a safety switch and so arranged that the cover cannot be opened unless the switch is in the open position. Illustrated is a 3-pole Burndy Disconnector, Type S3K. All cable connectors are clamp type. An additional clip and blade serves to ground the spider casting when the disconnector is closed. The three flexible braids are attached directly to the terminal pads on the load side of the safety switch.



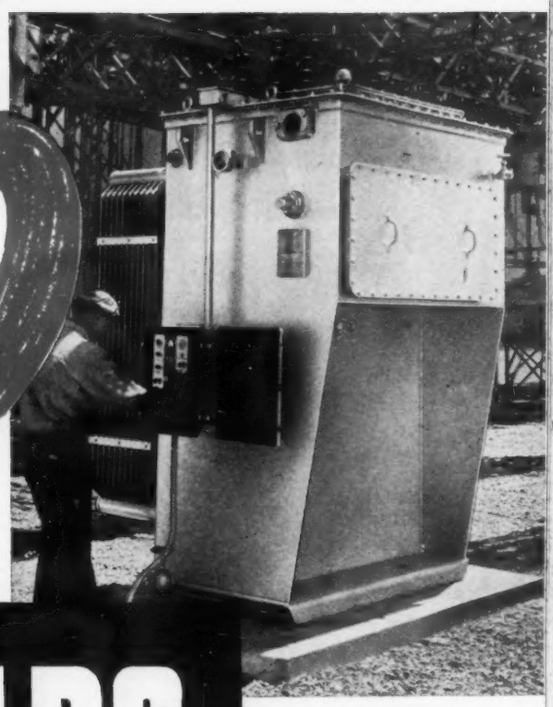
Lightweight Limit Switch (911)

A lightweight limit switch has been designed by General Electric Co. for aircraft applications. Contact mechanism is the G-E switchette. The plunger operates with a 7/32 in. overtravel, increasing the number of applications for which the switch can be used, the announcement states. Aluminum housing has a gasketed cover and space inside is adequate for easy wiring, the manufacturer claims. Available in three contact arrangements: single-circuit, normally open or normally closed; and single pole, double throw. Each form can be furnished with a contact air gap of .010, .020, or .030 in. Weight .13 lbs.

Glascote (912)

Glascote, a transparent liquid coating to prevent shattering, pitting or scarring of glass, is offered by the John C. Dolph Co. It is recommended by the manufacturer as a protection for unshielded lamp bulbs against welding spatter and rain water, and for window panes in factories and plants as a safety factor in case of air raids or explosions. Brilliancy of the light is in no way retarded, according to the manufacturer, and the coating can be removed by peeling or with thinner.

HOW AN ENGINEER SAVED



OVER 75,000 LBS. OF COPPER!

HELPING TO INCREASE production in war-busy industrial plants, Allis-Chalmers 5/8% Step Regulators, like this 375 kva, 12,000 volt three-phase unit, are in use all over the country.

Improves Motor and Lamp Performance in New Armament Plant . . . Saves Thousands of Pounds of Copper and Vital Man-Hours for the Victory Effort . . . by Installing an Allis-Chalmers 5/8% Step Regulator!

A NEW armament plant was going up on the outskirts of a midwestern city. Power was to be supplied by an existing 5½ mile, 12,000 volt, Y-connected line already carrying 2100 kva. But the No. 0 copper wire was too small to handle the added 1500 kva load without excessive voltage drop at the end of the line.

One of the many solutions that occurred to the Planning Engineer was to put up heavier wire — 400,000 cm on the three conductors to keep voltage variation within 10%. But this would require 78,500 extra pounds of copper* and hundreds of man-hours.

Other possibilities included moving the substation, increasing the voltage, tying in with another line, or building a new line. But, weighing all factors, he decided to install a feeder voltage regulator to maintain uniformly high voltage.

The regulator required only a few hundred pounds of copper . . . a fraction of the man-hours to build. What's more, the regulator takes care of fluctuating source voltage . . . corrects for reactance as well as resistance drop . . . permits better motor and lamp performance.

And, when they actually bought the regulator, they selected a 375 kva, 12,000 volt, 3-phase Allis-Chalmers AFR, the regulator with *proved on-the-line performance.*

Check the reasons (at right) why engineers choose Allis-Chalmers Regulators. For complete information write for Bulletin B6056. Allis-Chalmers, Milwaukee.

*Weight of three 5½ mile lengths of 400,000 cm wire = 16.5 x 1220 x 5.28 = 106,300 lb of copper. Weight of salvaged No. 0 wire to be credited — 27,800 lb.

A 1521

REASONS WHY ENGINEERS CHOOSE ALLIS-CHALMERS 5/8% STEP REGULATORS!

1 Closer Regulation! 5/8% half-cycling steps plus "Feather-Touch Control" permit band width settings within ±5/8 of 1%.

2 Longer Contact Life! Not a single contact has ever been replaced on an Allis-Chalmers Regulator due to deterioration under normal operation.

3 Lower Exciting Current! Need only 1/3 the exciting kva required by older types of regulators.

4 Increased Dielectric Strength! Unit construction eliminates 78 bolted connections between compartments.

5 Minimum Maintenance! No holding or braking devices. Complete oil-immersion of all moving parts means there's nothing to lubricate.

When On-the-Line Performance Counts... Count On

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

WARTIME LIGHTING COSTS REDUCED!

General Electric announces a 12% to 17% reduction in the price of G-E MAZDA FLUORESCENT LAMPS!

Effective September 1, 1942

NEW LOW PRICES ON G-E MAZDA F LAMPS

14-WATT T-12	was 80c	now 70c
15-WATT T-8	was 65c	now 57c
15-WATT T-12	was 80c	now 70c
20-WATT T-12	was 80c	now 70c
30 WATT T-8	was 80c	now 70c
40-WATT T-12	was $1.15	now 95c
100-WATT T-17	was $2.60	now $2.15

Above prices refer to daylight and 3500° white. Prices also reduced on soft white and colored G-E MAZDA F lamps.

Also reduced! G-E MAZDA H (Mercury) LAMPS

400-WATT T-16 AH1	was $11.00	now $9.50
400-WATT T-16 BH1	was $11.00	now $9.50
3000-WATT T-9½ AH9	was $45.00	now $40.00

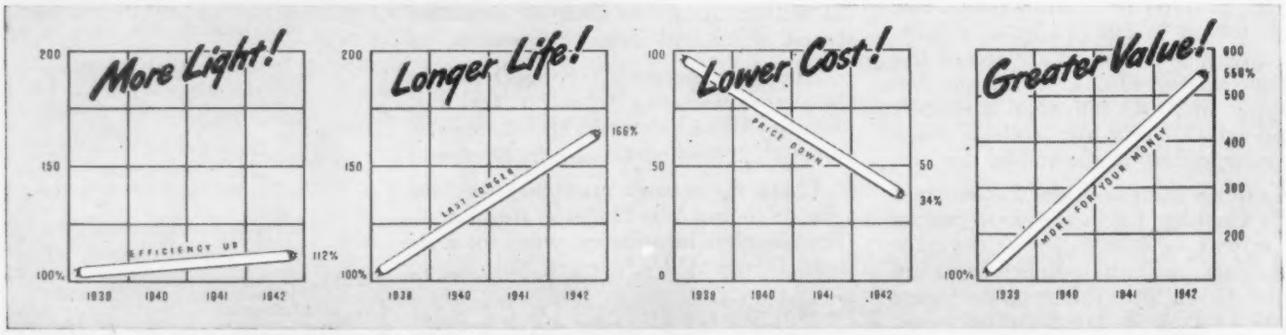
THE SEVENTH REDUCTION IN FOUR YEARS!

NO price reduction, of the many we have been able to make, gave us in General Electric as much genuine satisfaction as this one—made possible at a time when light is being called upon to play a major role in wartime production.

Made in the face of rising cost trends, this reduction is the result of manufacturing economies and technical developments, combined with vastly increased use. It is made in accordance with G-E's policy of passing such savings along to customers.

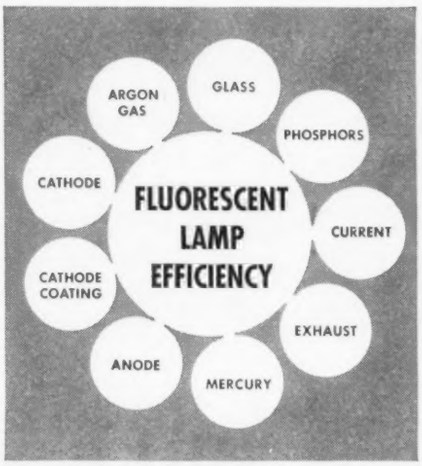
But lower prices are only half the story. Not only have we been able to reduce prices, we have steadily improved these lamps. They give more light! They last longer! They *stay brighter longer!*

For instance, purchasers of the widely used 40-watt white G-E MAZDA F lamp now pay only 95c instead of the $2.80 they paid in 1939. But we are prouder that this lamp lasts 66% longer and is nearly 12% brighter . . . that it gives you 5½ times more value for your lamp dollar than it did in 1939! (See charts below.)

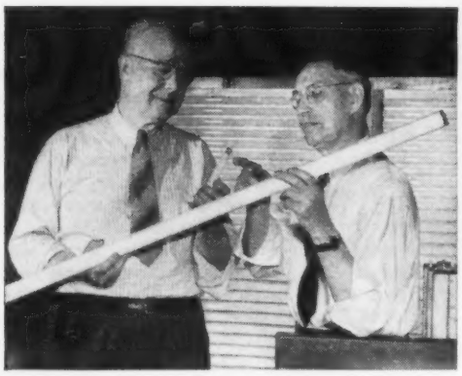


The Story Behind MORE LIGHT *for* LESS COST

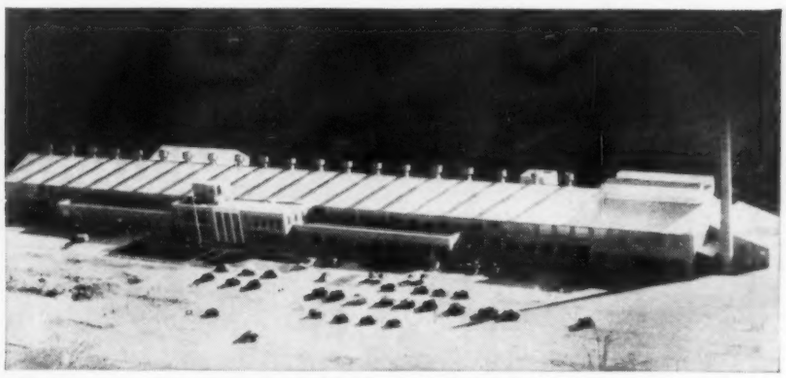
G-E research constantly seeks the best possible combination of all factors affecting lamp efficiency. Here are nine of the most important. There are more than a million possible combinations of these factors. It's the task of G-E research to find the *best* possible combination!



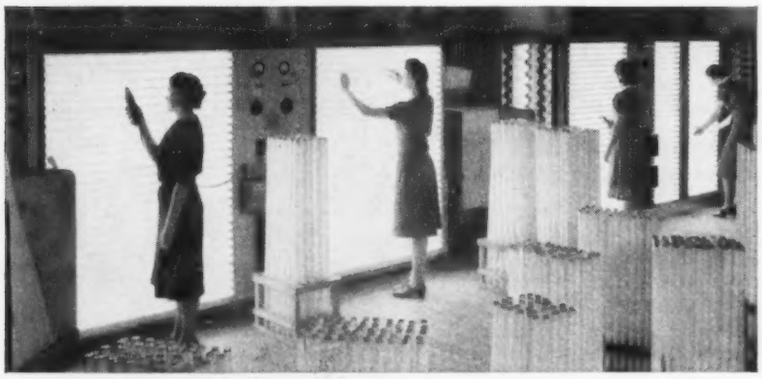
All materials are tested with extreme care. Here, we check the brightness of phosphor powders that coat the inside of fluorescent lamps to make sure that you get maximum performance from your G-E MAZDA F lamps.



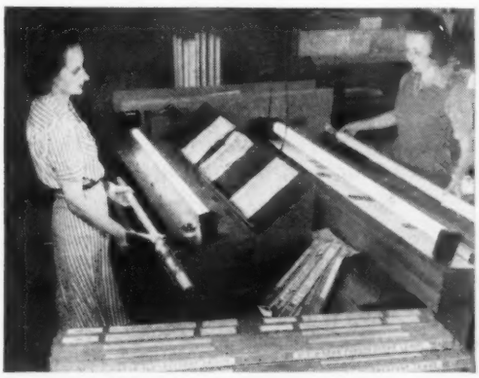
Experience counts. W. L. Enfield (left) and P. J. Pritchard have been active in directing research for better product and lower prices.



Here is one of the new streamlined, specially designed G-E fluorescent lamp factories that have helped materially in reducing costs. Sand for glass tubes comes in at one end. Finished lamps are shipped from the other.



Constant testing guards the quality of G-E MAZDA fluorescent lamps. At every stage in the manufacturing process, General Electric inspections provide safeguards of quality. Above, G-E MAZDA lamps are inspected while undergoing a "seasoning" process on the test racks.



Extra assurance of quality is a series of over 50 tests and checks on completed lamps by MAZDA SERVICE inspectors, who work under the direction of an independent testing laboratory.

Use More
DROP FORGED
Pole Line Hardware And Obtain

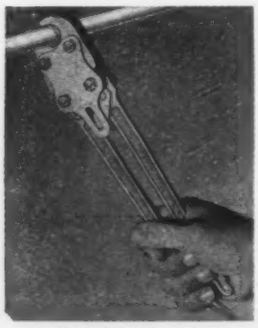
1 Plus Strength in Lighter Sectional Thicknesses.
2 Uniform Physical Structure, Size and Shape.
3 Freedom from Concealed Defects.
4 Extra Margin of Safety.

Forgings offer many direct and indirect economies. Consult makers of drop forged pole line hardware.

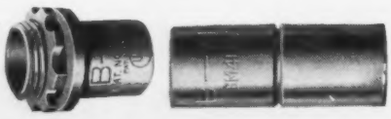
DROP FORGING ASSOCIATION
605 HANNA BUILDING • CLEVELAND, OHIO

And there's just as much difference between the *streamlined* BRIEGEL METHOD of making conduit connections and former, old-fashioned methods!

Take a look at the picture below: two squeezes with the patented B-M "indenter" (which costs only $1.25) and you have a smooth, efficient job when you use B-M connectors and couplings. No extra turns or twists—no nuts to tighten!



The BRIEGEL METHOD saves you up to 50% on time and a substantial materials-saving (in keeping with today's thinking). Means more profit, too. Approved by Underwriters' Laboratory, of course.



DISTRIBUTED BY

The M. B. Austin Co., Chicago, Ill.
Clayton Mark & Co., Evanston, Ill.
Clifton Conduit Co., Jersey City, N. J.
General Electric Co., Bridgeport, Conn.
The Steelduct Co., Youngstown, Ohio
Enameled Metals, Pittsburgh, Pa.
National Enameling & Mfg. Co., Pittsburgh, Pa.
Triangle Conduit & Cable Co., Elmhurst, N. Y. C.

BRIEGEL METHOD TOOL CO., Galva, Ill.

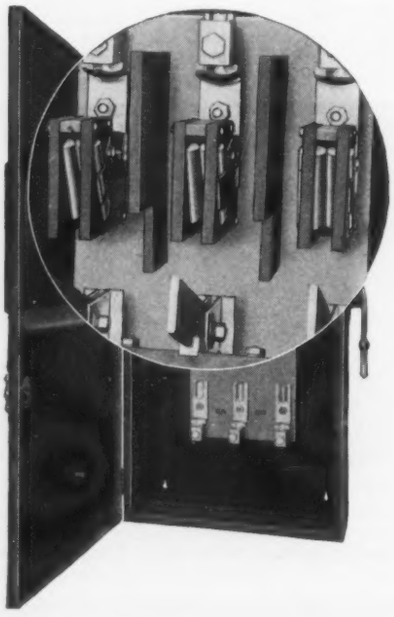
Pressed Board Reflector (913)

New reflectors developed by Day-Bright Lighting Inc. use a pressed board with 325° baked enamel finish in place of steel. The manufacturer claims that recent tests have

shown reflection factors of more than 81% and savings in steel of more than 64%. Available in single units and continuous fixtures.

Rolarc Safety Switch (914)

Federal Electric Products Co. has developed a safety switch, the Rolarc, which it claims incorporates an entirely new principle of arc control. The Rolarc is available from 100 to 400 amp. Two cylindrical rollers, fabricated from high arc-resistant material, are located immediately above the final disengagement of the current rupturing members. These rollers form two parallel insulating barriers and are supported by a specially designed spring tension which, in the free position, holds the rollers flush against each other. Thus, when the switch blade is opened, it passes between the lubricated rollers separating them only by the thickness of the blade. Immediately upon the disengagement of the blade from the "line" stationary jaw, the rollers snap tightly together forming an insulated barrier that interrupts the arc. These rollers rotate with each operation of the switch blade, reducing friction and presenting a new, cool surface to the influence of the arc, the announcement states.



The manufacturer claims that under test it has been proved that the incorporation of the Rolarc snuffers lengthens the life of the switch and that, after many operations under load, it is practically as good as new.

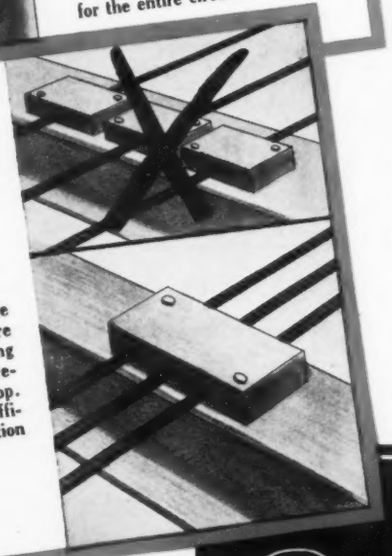
3 More Ideas That Give LONGER LIFE to Insulated Cables

INSPECT RISER CABLES

for evidence of mechanical distortion at conduit edges and for surface deterioration and abrasion. Possibility of trouble at these points can be eliminated by re-training cables and applying protective paint. Okolite-Okoprene riser cables, of course, do not need painting as the Okoprene sheath is proof against the elements. (Booklet OK-2009.)

VENTILATE POLE RISER CONDUITS

and create circulation by making openings near the top or by leaving space between conduits and pothead. Riser cables are frequently the bottlenecks that limit the capacity of underground and submarine cables. Reduce temperatures by permitting air circulation in riser sections and obtain maximum efficiency for the entire circuit.



SPACE YOUR CABLES

as close together as possible on overhead circuits where voltage drop is the limiting consideration. This will reduce reactive voltage drop. When doing this, leave sufficient space for air circulation to prevent overheating.

Okonite is combing the industry for operating practices that prolong cable life and is passing these ideas along to you. If you have any such suggestions that you are willing to share with others, won't you send them to us?

BUY U. S. WAR BONDS—*Every Payday*
All Okonite Employees BUY U. S. WAR BONDS

If you don't have a copy of this Okonite booklet packed with practical ideas and illustrations for making insulated wires and cables last longer—

Write for it now.

THE OKONITE COMPANY
Passaic, New Jersey
Offices in Principal Cities

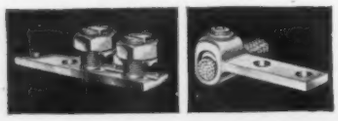
OKONITE
Insulated Wires and Cables

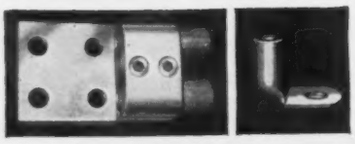
BUY U. S. WAR BONDS—Every Payday All Okonite Employees BUY U. S. WAR BONDS

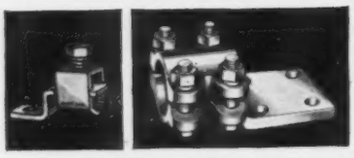
"To get the **RIGHT** lug at every point—

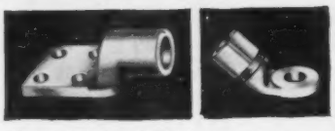
—select your terminals from the **COMPLETE** line"

Look in the Penn-Union Catalog—all of the good types: Solderless lugs to grip the conductor by Bolt, Screw, Post-and-Nut, or Multi-Slit Tapered Sleeve . . . Soldering lugs, Cast and Stamped, in wide variety . . . Here are just a few:









You will also find the most complete line of Cable Taps, Tee Connectors . . . Straight, Parallel, Elbow and Cross Connectors . . . Bus Supports, Clamps, Spacers . . . Grounding Clamps, Service Connectors.

KENNETH ANDERSON CO.
334 East 4th St., Los Angeles

NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington

F. M. NICHOLAS CO.
1123 Harrison St., San Francisco

Penn-Union Electric Corp., Erie, Pa.

PENN-UNION
Conductor Fittings

BULLETINS

data books, etc.

Protective Lighting (915)

"Light Up to Protect War Production" is the title of a 12-page booklet published by the Line Material Co., describing the various conditions of protective lighting and offering suggestions on layout. Recommendations are given for mounting heights and spacing and the booklet also contains illustrations and listings of standards, brackets and mast arms. The wiring diagram of typical multiple and series circuits is illustrated, showing the application of circuit control and protective equipment.

Power Circuit Transformers (916)

Power circuit transformers are described in a bulletin prepared by the Jefferson Electric Co. This 12-page bulletin tells the uses of dry-type power circuit transformers and includes circuit diagrams of electrical installations for lighting and power, showing advantages of transformer installations. Also included are winding diagrams, dimensions, data and prices. Data is included for the double-wound transformers in sizes from .05 to 15.0 kva. output and for auto transformers in sizes from 0.1 to 25.0.

Circuit Control Switches (917)

General Electric Co.'s appliance and merchandise department has announced a 4-page bulletin describing G-E circuit control switches for industrial applications. Switches shown are for use in signalling equipment, communication apparatus, instrument panel boards, utility lighting systems, specialized lighting equipment, aircraft circuit control systems, etc. Wiring diagrams of switches and specifications of assembly parts are given.

Trol-E-Duct (918)

BullDog Electric Products Co. describes its Universal Type Trol-E-Duct in a 28-page bulletin published recently. Trol-E-Duct is a prefabricated busway wiring method which the manufacturer claims provides highly flexible lighting. The bulletin covers the "700" line, which supersedes the "200" line. Diagrams show representative layouts with the system.

Air-Cooled Regulator (919)

An 8-page booklet giving a quick non-technical summary of the outstanding characteristics of its Type SA air-cooled induction feeder regulator has been announced by Westinghouse Electric & Mfg. Co. The bulletin includes design features and a cutaway diagram showing the air cooling process, and four pages are devoted to construction details with illustrations.

"Keep 'Em Rolling" (920)

A booklet describing highlights of its 25-min. motion picture, "Keep 'Em Rolling", is offered by the B. F. Goodrich Co. The booklet includes request cards for the film, which shows the importance of rubber in the nation's war effort.

Porcelain Protected Wiring (921)

Porcelain Products, Inc., has prepared an installation manual and data book on porcelain protected wiring systems. The pamphlet contains general information on Knob and Tube wiring; 1940 Code requirements and common construction details for porcelain protected wiring systems; Surfolet wiring data; table of comparative carrying capacity of conductors.

Distribution Transformer (922)

Line Material Co. has published a 16-page booklet titled "Interesting Facts About the L-M Round-Wound Distribution Transformer". This publication describes a trip to the L-M transformer plant, and shows pictorially how the two round coils are wound directly on to the wound core, how the core and coil are assembled, how the tanks are constructed and how each transformer is assembled and tested.

Ideal Accessories (923)

Ideal Commutator Dresser Co. has issued a new booklet describing Ideal machine tool accessories. Covered are live centers; metal etcher; demagnetizer; grinding wheel dresser; balancing ways; variable speed pulleys; electric marker; portable cleaners.

Day-Line Fixtures (924)

Day-Brite Lighting, Inc., has issued a bulletin covering its new V-Series Day-Line industrial fixtures with non-metallic reflectors. These fixtures incorporate the recently developed pressed board reflectors.

ELECTRICAL WEST, 68 Post St., San Francisco, California.
Please send me the following CIRCLED items:

900	901	902	903	904	905	906	907	908	909
910	911	912	913	914	915	916	917	918	919
920	921	922	923	924					

Name..... Company*..... Title*.....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

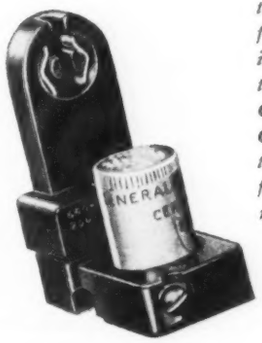
"Without exception, the properly designed starter can contribute more to the useful life of the Fluorescent lamp than any other accessory."

RIGID tests on delicate instruments such as the cathode-ray oscillograph have definitely proved that G-E Starters are properly designed to prolong the life of your fluorescent lamps and give more economical fluorescent lighting. For instance:

In all G-E Starters, preheating of the lamp electrodes is accurately timed to start the lamp at the right moment — not before, not after. This accurate timing conserves lamp emission material (vital to long lamp life).

In all G-E Starters, the constant breakdown voltage is maintained throughout the life of the starter at a point where it will not interfere with good lamp operation. Again, lamp life is prolonged through proper design.

It's not surprising, then, that enthusiastic users everywhere ask for G-E Starters when they want the best performance from their fluorescent lighting equipment.



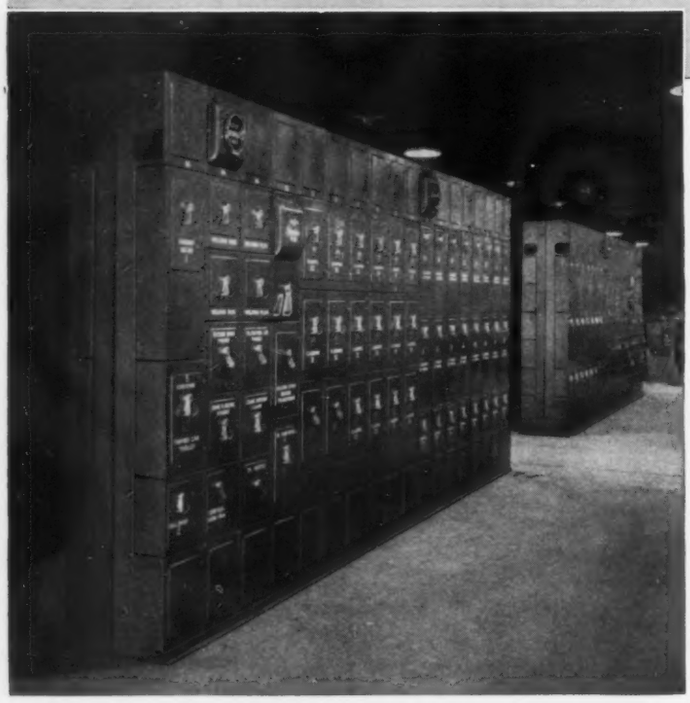
WHEN BUYING FLUORESCENT FIXTURES—Insist that your fixtures have certified G-E equipment consisting of G-E Starters and Rotating Lock Lampholders, G-E Mazda F Lamps, and G-E Ballasts. It's the best way to buy "protection" for your fluorescent lighting equipment.

For complete information on G-E Starters and Rotating Lock Lampholders, write Section G924-18, General Electric Company.

APPLIANCE AND MERCHANDISE DEPARTMENT, BRIDGEPORT, CONNECTICUT

GENERAL ELECTRIC

TRUMBULL'S control center PLAN.. CAN PUT YOUR PLANT ON THE ALERT



Trumbull Motor Cantrol Centers, installed back to back.

to meet QUICK EXPANSION demands with flexibility for future changeover

● Trumbull Control Centers consist of vertical troughs containing the main bus bars into which totally enclosed dead-front protective switching and control units are plugged (by means of "stab" connections). These assemblies are so designed that they may be grouped in practically any desired combination and number to form complete centralized motor control units or plant power switchboards.

That is a big contribution to the war-time art of getting things done FAST. With no special engineering required, these standardized pre-fabricated control units are assembled in your plant "like file cabinets" . . . and almost as speedily.

You get into production weeks faster. You use a MINIMUM of vital materials. And the finished job will represent the very latest in electrical control, PLUS complete flexibility for extension, division or relocation as war or peace work demands.

Have full information at your fingertips. Write at once for new Trumbullaid Bulletin 411.

MOTOR CONTROL CENTERS

Trumbull Motor Control Centers include Combination Magnetic Starters in Sizes 1, 2, 3 or 4, together with necessary switch or circuit breaker disconnects. These may be assembled in the verticle troughs in any desired combination of sizes and regrouped after installation to meet changing requirements.

SWITCHBOARD CONTROL CENTERS

Designed to provide complete centralized power and light feeder circuit protection and control through correct grouping of "Type A" fusible and no-fuse switch units, Type "AT" Circuit Breaker units, or a combination of both.

Furthermore, since basic equipment of both types of Control Center is standardized, the functions of switchboard and motor control may be combined in one control center assembly where desirable.

FASTER INSTALLATION

MINIMUM SPACE REQUIREMENTS

CONSERVATION OF VITAL MATERIALS

UNLIMITED FLEXIBILITY

●

Control centers flat against wall in limited area

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY
PLAINVILLE, CONN.

THE TRUMBULL ELEC. MFG. CO. PLAINVILLE CONN. U.S.A.

OTHER FACTORIES AT NORWOOD (CINN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES

After Re-Fusing, Clip Off the Cable —But SAVE IT!

You can help save thousands of pounds of critical metals by saving the clipped-off cables when installing fuse links. Don't throw them away.

To insure the maximum protection, it will pay you to install S & C Fuse Links with *silver* fuse elements. S & C Silver Links retain accuracy, do not corrode, and have high surge capacity. Unnecessary outages are reduced, saving man-hours and many needless truck miles.

Save the cables

SCHWEITZER & CONRAD, INC.
4435 RAVENSWOOD AVENUE • CHICAGO, ILL.
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ont.

S&C

Silver FUSE LINKS
FOR ALL MAKES OF CUTOUTS

WESTERN REPRESENTATIVES:

SAN FRANCISCO
George E. Honn, 420 Market Street
LOS ANGELES
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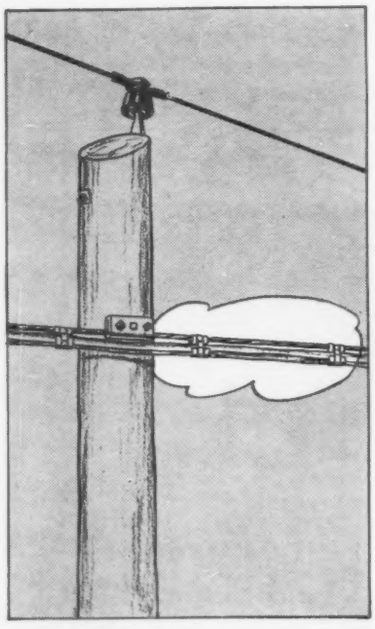
SEATTLE
T. S. Wood, 220 Ninth Avenue, North
SALT LAKE CITY
Riter Engineering Co., Kearns Bldg.

Reduce Outages
Avoid Cable Wear
Reduce Maintenance



RELIABLE
CABLE HANGERS

Prolong life of cables and conserve strategic materials by eliminating wear on cable sheaths or on insulation of hand made cables. Reliable cable hangers hold cable and messenger together tightly with wide bearing surfaces which eliminate snaking and chafing. They are easily applied and make installations that are permanent and very neat

Reliable
ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

BOOKS
you may want

PRINCIPLES OF RADIO, by Keith Henney, John Wiley & Sons, Inc., N. Y. 536 pages + XII pages + 13 page index, 310 figures, 5¾ x 8, $3.50. This book is especially valuable to those who wish to understand the fundamental principles underlying radio phenomena and has been written from the point of view of the student who has not had the advantages of a higher education nor the benefits of advanced mathematical training. The first few chapters discuss the nature of electrical phenomena, the mathematics involved, the analysis of plotting curves, ohms law, properties of circuits, such as resistance, inductance and capacitance, their combinations in series and parallel, a description of shunt and series resonance. The production of current and voltage in both direct current and alternating current phenomena are defined and their behavior described.

The remainder of the book is devoted to radio principles and apparatus. Wave length and circuit selectivity are clearly and simply explained. The theory and design of the vacuum tube is adequately treated. Their uses, such as detectors, radio-frequency amplifiers, audio frequency amplifiers, oscillators and rectifiers are described. Radio apparatus circuits, such as receivers of all types, including the superheterodyne, regenerative types, etc., and transmitters, and power oscillators are given a broad general treatment. Amplitude and frequency modulation are defined and their applications are discussed. Antenna design is outlined and a chapter explaining briefly the design of facsimile and television transmission is included.

The book has many examples and is well illustrated; the mathematics required is limited to arithmetic and algebra, making an excellent treatise for those wishing to obtain a good fundamental background of radio frequency theory, apparatus and its related phenomena.—F.S.B.

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE (seventh edition), 6 x 9, 1,308 pages, 1,810 illustrations, The Lincoln Electric Co. $1.50 in the U. S., $2 elsewhere. This edition has been enlarged and explains more fully the various methods and techniques used, with a view to speeding welding design and engineering. New information is given on such subjects as welding symbols, new allowable stresses, pre-heating for welding, stress relieving, procedures, speeds and costs, "Fleet-Fillet" technique, general metallurgical characteristics of metals and alloys, weldability of aluminum alloys, tubular construction, appearance and styling of welded design.

ELEMENTS OF HEAT TRANSFER AND INSULATION, by Max Jakob and George A. Hawkins, John Wiley & Sons, Inc., $2.50, 6x9 cloth, 169 pages, 50 figures. The authors, one of whom has been well known for years for his work in the field of heat research, say in their preface that the book is designed for courses suitable to junior and senior engineering students.

Such students will find the fundamentals of the subject well treated, and rather complete lists of references scattered throughout the book for those who desire to study more advanced works.

Many engineers whose work includes heat transfer problems will find the book useful as a reference to formulae, physical data, and perhaps refresh the memory as to some of the theory; also will be grateful to the authors for being as easy as possible with the mathematics.

The subjects covered include the usual simple forms of heat conduction, the more complicated forms of heat transfer involving motion, shape, viscosity, etc., heat transfer for various forms of heat exchangers, condensers, and evaporators. There is included a chapter on temperature measurements and another on the relation between heat transfer and fluid friction.—R.C.P.

LETTERS
to the editor

Editor ELECTRICAL WEST:

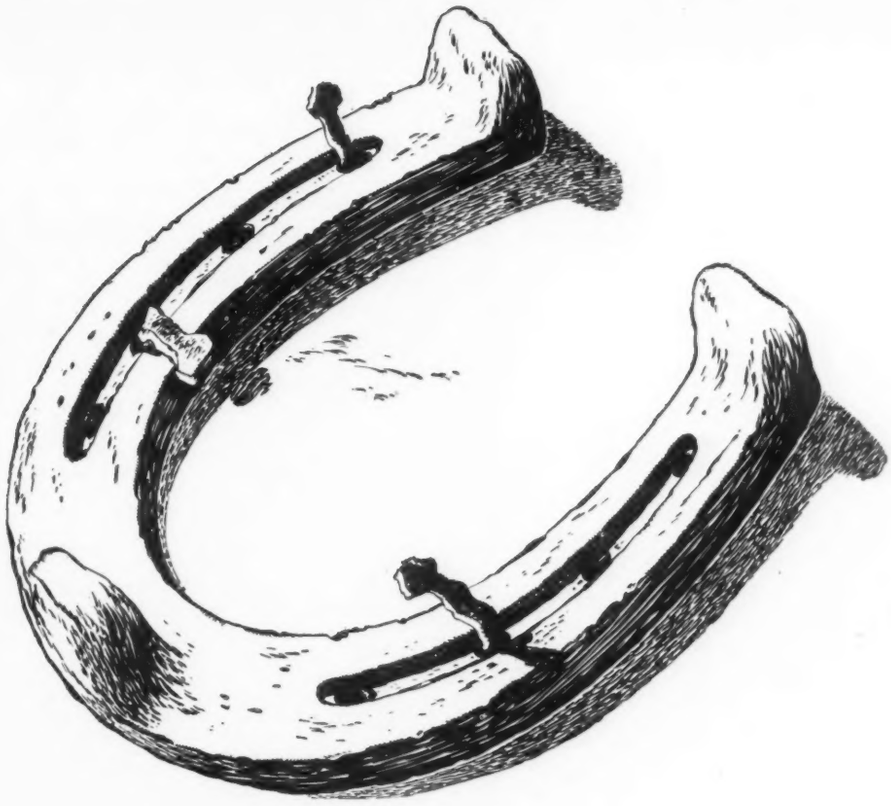
I have read with a great deal of interest your editorial, *Time to Standardize.* Those of us who have been working to gain broader acceptance of standardization of water heating equipment appreciate the boost which comes through such items in the technical press. I hope your editorial is not only widely read, but also acted on by those reading it.

You may be familiar with the chronological development of the effort to standardize but in order to bring you up to date on the work of several committees now interested in this subject, I might start by pointing out that the joint NEMA-EEI committee in 1938 completed a set of test specifications for control purposes, omitting all but a few minimum performance values (EEI Publication F-8). Consideration is now being given to establishment of additional performance values important to utilities and customers after many months of experience on the part of utilities and manufacturers.

For over two years the EEI Electric Water Heating Committee has been studying this subject from the viewpoint of the electric utility and following the analysis of a questionnaire filled in by over 100 operating companies, the EEI published its recommendations (EEI Publication 1-5). As the result of general acceptance of NEMA proposed standards by the large majority of operating companies, the EEI General Commercial Committee passed a resolution recommending the adoption and support of the NEMA standards and joint EEI-NEMA test specifications by the utility industry.

Since the printing of the committee's report (1-5) in October 1941, the American Standards Assn. has established a committee on electric water heaters. This ASA committee, under the chairmanship of Dr. Earl C. McCracken, Columbia University, is composed of representatives from consumer groups, government bureaus, dealer associations, testing laboratories, manufacturers, electric light and power interests and others. That committee is reviewing the test specifications with the thought of adopting specific values and is analyzing the whole problem of standardization. Because it was the feeling of some representatives on that committee that the number of heating element sizes and tank sizes could be further reduced from that recommended by NEMA, Dr. McCracken has appointed a sub-committee on ratings. This sub-committee, of which I am chairman, is now engaged in determining the minimum number of sizes of heating elements and tanks from a practical standpoint and later this fall should be in a position to make a recommendation to the ASA committee.

C. M. Turner, Chairman
EEI Electric Water Heating Committee



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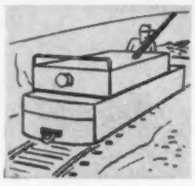

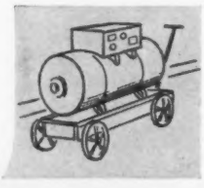

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Copper is of prime importance in the national war effort. You can help conserve this essential metal by detaching and saving shunts and connections from worn-out brushes. The copper you save in this way can be turned over to local salvage agencies to be returned to the nation's supply and thus find its way back into some war task.

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LET'S GO! U.S.A. KEEP 'EM FLYING!

ANOTHER EXAMPLE OF *Kuhlman* ENGINEERING

The Kuhlman Power transformer shown here has automatic forced cooling and air in the transformer tank is replaced by nitrogen under pressure. End coils are reinforced to protect the transformer from surge potentials. Long connections between coils prevent wire breakage due to vibration. Tap leads are supported by heavy tubing. Bushings are extra sturdy to insure against breakage. In fact, each component part is built for heavy duty service. Write today for further information.

View shows automatic forced air cooling unit.

View shows primary and secondary junction box with face plate removed.

Kuhlman ELECTRIC COMPANY • BAY CITY, MICHIGAN

ELECTRA'S HUSBAND

Light on the Rubber Situation

ELECTRA is confused about the rubber situation. But then who isn't? That goes for all of the radio commentators who have had something (nothing) to say on the subject. By way of clearing up Electra's confusion, I took the following letter home to her recently. It has been making the rounds and thus adding to public knowledge. It's from Citizen A to Citizen B:

"I have been doing a lot of reading about rubber of late and I wonder whether the public is as confused as I am and whether the experts on the subject are as mixed up as they sound. I will here reduce my impressions on this question to the following simple statements, so as to permit you to fog yourself up properly and be in position to add to the mental murkiness that seems to be needed in the war effort.

"1. The rubber stockpile has all but disappeared and under the lend-lease program we have just enough left to supply three spare tires to El Salvador, with maybe one rubber garment for Mohandas Ghandi.

"2. We have plenty of rubber in the stockpile to take care of all the military needs for two years and by that time there will be enough synthetic product to get all the cars back on the highways.

"3. There is very little rubber in the country that can be reclaimed, with the exception of anywhere between five and fifty million tons lying around all over the place, all of which could be made into new tires and into re-cap material, either of which is not worth having or is superior to fresh rubber, depending on who is telling the story.

"4. Rubber can be made out of practically anything, of which we have plenty. A man in Brisket, Vermont, made some out of a tubful of potato peelings and apple cores, using Epsom salts as a catalyst. Anyway he said he did and got his picture in the paper, followed by an interview from Washington with two PhD.s and an OFF denying that it was possible to make rubber from such trash. Other stories have built up a potential plethora of rubber substitute made of whatever was left over from Sunday's dinner, from goats' milk and from curlew eggs.

"5. There is a vast reserve of rubber to be made from guayule, which is being held back because few can pronounce the word. Rabbit brush, milkweed, hedge apples, persimmons gathered in the dark of the moon under the zodiacal sign of Scorpio, after the first frost, are some other sources. The rubber trust is interfering with such production.

"6. There is an inventor, probably Portuguese, maybe Latvian, whose name is either Tamulapius or Frobisher, who has a highly guarded formula for making rubber out of water. He has appeared in several towns and has exhibited proof of his research in the shape of a small ball, with dimpled cover, on which is stenciled the name 'Acushnet.' Philologists have been unable to supply a translation and it is supposed that the word is the shibboleth of a mystic cult, or part of a college yell. This inventor always disappears after each interview and bobs up several hundred miles away. It is supposed that he is subject to espionage and counter-espionage, and even counter-clockwise spying by the Gestapo, GPU and a man named Gus.

"7. Rubber can be made from petroleum. It is being so made. There are many formulas for this. Any household that has a few barrels of butadiene and a crock of styrene can make its own tires. For home cooking, the best recipe is two parts buta, etc., one part styrene and five parts RFC loan. The old pre-Prohibition gin and elderberry wine-making equipment salvaged from the basement is excellent for this purpose and does away with the necessity for securing a priority.

"8. Care of tires. There are two schools of thought. One holds to the theory that it is best to use them carefully and make them last, and another is that we should use them up as quickly as possible and add to the reclaimed rubber supply. A new board is being appointed to survey both theories. It will be known as the OGG—Office of Guessing Games.

"The foregoing should fix you up nicely with enough garbled data to enable you to supply the answers to questioners in the same way that everyone now is being informed, provided he reads faithfully all that is being printed on the subject of rubber.

"My own idea is that the quickest way to get our rubber supply up to normal is to lick the Japs."

Electra was ready to interrupt me long before the end of the letter.

"That's just exactly like one of the women said down at Red Cross the other day," she exclaimed. "Her husband knows a man who has a friend who saw a demonstration at a luncheon meeting recently. Somebody simply poured some liquid out of a bottle into a glass that had water or something in it. A ball of rubber formed just like that." And she snapped her fingers.

"This man said anybody could do it," she continued. "Only he couldn't get anyone to listen to him back in Washington. He said if he could use one of the wineries down in the San Joaquin he could make plenty of rubber."

"But you don't believe any of this stuff?" I asked.

"No more than you do," she replied with the usual sparkle in her eyes that comes when she gets me to take the bait. "We'll get synthetic rubber when we cut out the selfishness, suspicion, competition and politics and get down to business. And we won't get any of the real thing until we push the little yellow boys right where they belong—over their heads in the Pacific Ocean."

NO ONE was more surprised than both Electra and I to learn that the Englishman who conceived the program based on the theme "It All Depends on Me" is a member of the electrical fraternity. The originator of this plan, which has done so much to bring individual responsibility and the war home to so many people in England, is Eric L. Colston, managing director of Hoover, Limited.

"It All Depends on Me" has become a nationwide movement in England. The publicity program, according to a brochure sent to us, overlooks no avenue for spreading the gospel that Victory will be the sum of countless individual efforts, some far remote from the actual shooting or flying or fighting. The spirit of the whole thing—a spirit that might be well adopted in an America where people still feel apart from the war—is extolled in this quotation from one of the little pamphlets:

"There are hundreds of little jobs waiting to be done—apart from the big things. . . . Remember that this war is being won in our hearts as well as in our homes and factories. It is up to each of us to be sure we have a place on the team and then to play our best. We are *all* concerned because individual responsibility is the cornerstone of democracy."

to get transformers into service *FASTER* . . .

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They require no vaults, no long secondary runs, no special foundations. Mounted indoors near the load center (and meeting all Electrical Code safety standards) they conserve copper and speed installation.

When you specify *air-cooled* distribution transformers, you save time—the only irreplaceable element in the nation's vast productive effort.

They're completely safe because they're bone-dry. No fire hazard. No explosion hazard.

The parts of the coils not protected by the core are enclosed in ventilated fabricated steel end caps, which results in a sturdy unit. Connections may be made in the upper end cap, eliminating the need of terminal chambers or junction boxes. Normal construction has conduit fittings, but they can be furnished with bushings through cover upon request.

J-70375

RATINGS

Type VR 55 Deg. C. rise
Class A insulation
15—100 kv-a, single-phase
15—100 kv-a, three-phase

Type AVR 75 Deg. C. rise
Class B insulation
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37½—100 kv-a, three-phase

Type JR dry type transformers with wound coils suitable for wall mounting can be supplied from 1 to 10 kv-a.

Type ASL air-cooled transformers can be supplied 150 kv-a and above.

air cools and insulates

Air not only replaces oil as an insulating medium, but also provides an efficient means of cooling. Large air ducts carry a flow of natural draft ventilation between primary and secondary coils. Windings are spaced to provide most efficient circulation, with minimum over-all dimensions. Hard, smooth surfaces of the transformer windings are easily kept clean. Exposed surface of the shell form core is cooled by direct radiation and the flow of ambient air. Thus, air COOLS as it INSULATES.

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* All this extra short-time overload capacity is made available—safely—with loading by copper temperature.

The greater short-time overload capacity made usable in CSP distribution transformers with Loading by Copper Temperature will help you meet today's growing loads without "overtransformering" new installations. Loading by Copper Temperature—one of the greatest improvements ever made in distribution transformer design—is standard on CSP distribution transformers and available in any rating of power transformers.

DIRECT ADVANTAGES to you include improved service continuity (more short-time useful overloads without outages), reduction of transformer size, an automatic load check which eliminates costly load surveys, and an assurance that you are using *all* the thermal capacity in your transformers.

HOW IT WORKS—Actual winding temperature controls loading through a thermal relay which takes load duration and magnitude into consideration. A red warning light is turned on before winding temperature reaches the danger point. If load continues to grow, an *internal circuit breaker* trips transformer from the line.

Loading by Copper Temperature has been thoroughly field-tested for more than eight years in all kinds of applications. For complete information call your Westinghouse Office or send for Descriptive Data 46-100. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-70366

Westinghouse

The Aviation Industry is doing its job...

A Year's Production A Week — Every Week

A MERE hundred planes a month in 1938; 200 in 1939; 450 in 1940; 1,600 in 1941, and today, as this is written, plane production goes on at a rate of 5,000 a month. A previous year's production now in one single week — every week.

So begins the story of the greatest industrial expansion in history; an industrial miracle that far surpasses anything our enemies ever have done or can do. Not only did we out-produce the Axis but the acceleration in our production during the past 12 months exceeded the greatest increase in German output during their forced-draft war preparation of 1939, when their production rose from 1,100 to 1,600 planes per month.

The toughest part of our job was accomplished in 20 months. We boosted deliveries from 100 or so to 1,000 planes a week, passing the combined Axis powers. Today, Germany's curve is flattening; ours is climbing steeply. Lt. Gen. Henry H. Arnold, Chief of the Army Air Forces, assures us that Army contractors will produce not less than 148,000 planes in the remainder of 1942 and in 1943. During that same period Navy contractors will turn out at least 37,000 additional planes.

Manpower in the airframe, engine and propeller industries was increased from 125,000 to 450,000 workers during the past 20 months, with the prospect that the industry will be employing more than 1,000,000 men and women in 1943. Many manufacturers are solving their personnel problems by recruiting women workers. More than 40,000 of them — teachers, stenographers, waitresses, housewives and school girls — today are welders, assemblers, machine operators and inspectors on aircraft production lines. Productive floor space in the airframe, engine and propeller industries expanded from 18,000,000 sq. ft. to nearly 55,000,000 sq. ft. during the last 20 months. Further expansion to more than 60,000,000 sq. ft. may be expected this year and an ultimate figure of more than 100,000,000 is a distinct possibility.

To grasp the full magnitude of this task we must remember that a single medium bomber has 30,000 parts, which are built into 650 minor sub-assemblies to make 32 major sub-assemblies. The entire process involves 30,000 man hours of labor. Each of the two engines in this plane requires 50,000 specialized inspections. Every one of the 50 instruments entails many hours of precision workmanship. Yet today there is one factory turning out 4 bombers every day. Another produces fighters at the rate of nearly 20 a day.

To the amazement of the entire world these manufacturing miracles were accomplished without sacrificing the high standard of American aeronautical equipment. There has been some loose talk about the quality of our combat airplanes as compared with those of our allies and our enemies. Indisputable evidence of the superior stamina of our aircraft under fire is written between the lines of almost every war communique. Every battle record tells a story of heavy losses inflicted at small cost upon numerically superior enemy forces. The consistency of this performance on all the far-flung battlefronts constitutes the most eloquent testimony of the high calibre of our designs, our manufacturing methods and the skill and daring of our pilots.

And let us remember that our decisive victory in the battle of production was not won without headaches and heartaches on the part of management, labor and government.

When the President sounded the call for 50,000 planes in the spring of 1940, the program called for only 5,500 military aircraft. Government and industry reeled from the shock — both determined, however, that it *could and would be done.*

The Army, the Navy and the old Defense Advisory Commission set to work to draft a program. This has been revised many times — upward! Congress then proceeded, more slowly, to modify the laws that would have obstructed the realization of the objective. Then the aviation industry, without contracts, in the face of discriminatory profit-limitative legislation, and with nothing but oral assurances of governmental intentions, went ahead with its Herculean expansion plans. New factories were completed long before facilities-contracts and their funds were forthcoming.

The rugged individualists who had founded and built the aviation industry cast aside their rivalries and embarked upon a period of unselfish cooperation. Priceless engineering experience was exchanged. Material was relinquished for transfer to plants where it was needed more urgently. Successful personnel training methods and experience in the use of women workers were pooled for the benefit of all concerned. During one re-

cent month, the cooperation among eight southern California plants averted more than 1,860 potential bottlenecks in production.

As the lessons of the war dictated the need for greater numbers of particular airplane types, many manufacturers accepted orders for planes designed and developed at rival factories. Striking examples are the long range bombers being turned out by plants where only trainers, fighters or dive bombers formerly were made.

Mindful of the risk involved in educating rivals, thereby creating future potential competition, subcontractors nevertheless were sought and trained by pioneer manufacturers. Makers of toys and wheelbarrows, automatic stokers and linoleum were among those who rallied to the call. Within a year subcontracting rose from 13 to 36 per cent of the total program. It still is rising.

When the automotive industry came into the picture, aviation manufacturers gave generously of their time and knowledge to start the newcomers. Liberal licensing arrangements enabled them to reap the full benefits of technical developments. Automotive engineers swarmed through the aviation plants in search of the exacting "know-how" of the aeronautical industry.

Each type of aircraft that reaches the production stage is the result of long periods of research, design and development. The unseen workers toiling in the wind tunnels and the laboratories of government and industry are the unsung heroes who tirelessly are striving to surpass all previous efforts. Their brilliant accomplishments are eloquent testimony of the superiority of men and women who are blessed with freedom of action and thought. Today more than 20 experimental combat airplanes are under development and will replace older types as soon as they fulfill the exacting requirements of our armed forces. Among these are aircraft that promise to outfight and to out-perform any and all of the much vaunted warplanes of the Axis military machine. And this without loss of production.

Every man, woman and child of all the United Nations may fervently be thankful that those who chart our course in aircraft production have not frozen design to such a degree as to make impossible the immediate adoption of improvements as they come out of these laboratories.

What does this brilliant record mean in terms of final victory?

Every newspaper reader has learned this basic war lesson . . . air supremacy is the essential ingredient of military success. As the balance of air power shifts, so do the fortunes of war.

In those dark days when our output was 500 planes a month, Germany's was 2,000 and the German air force was twice that of our Allies. When we reached 2,000 a month last fall, Germany had advanced to a monthly rate of 2,500. Today, as this is written, we have caught up with the enemy's backlog. The air forces of both sides are about equal numerically and United Nations' production exceeds that of the Axis by 27 per cent. Next summer (1943) both the air force and the output of the United Nations will be double those of all the Axis powers.

That is the pattern of ultimate victory!

The pattern of the peace to follow also is gaining in definition. The airplane has shriveled the world to one-fifth its former size. Its use as an instrument of destruction is but a momentary distortion of the pattern of human progress. Its potential power, as a stern preserver of peace, is beyond imagination. Today's air routes of our Army Air Force Ferrying Command are the international trade routes of tomorrow. Giant airliners, by reducing time and space, will speed fraternity among the nations and disunity will give way to better understanding and goodwill.

Flying freight trains, with aerial locomotives towing glider boxcars, will serve large cities, decentralizing population and giving to inland cities many of the commercial advantages of seaports. Air mail and passenger pick-up lines will fill the gaps between these transcontinental trunk lines and tie in the smallest hamlets. Universal fly-it-yourself services will provide airplane facilities for those who do not own low cost private aircraft. Roadable rotary wing aircraft and family planes of the fixed wing type may even run household errands.

The coming generation of business men who today is piloting our war planes will find aircraft as essential to business as it now finds them essential to victory.

Commenting on our war production record, Donald Nelson has said, "We are today in the position of men who realize that they are actually doing the impossible".

The mass production miracle that the aviation industry – management and workers alike – has performed through the all-out effort of free enterprise can and will serve civilization in peace as it has in war.

With this boundless new medium of transportation and its concurrent technological developments we shall rebuild our way of life to a rich, new fullness upon the ruins of a war-torn world.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the third of a series of editorials appearing monthly in all McGraw-Hill publications reaching more than one and one-half million readers.

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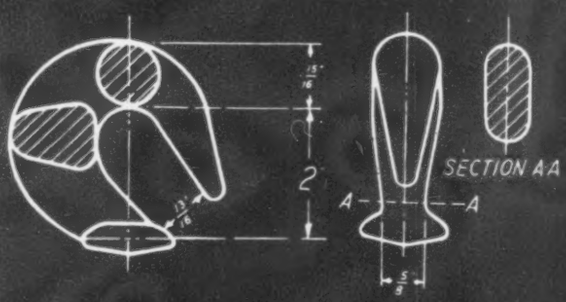

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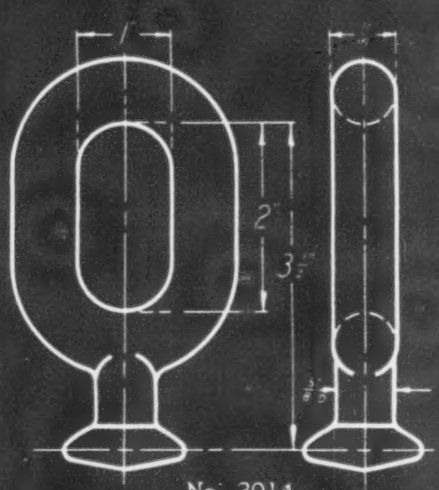

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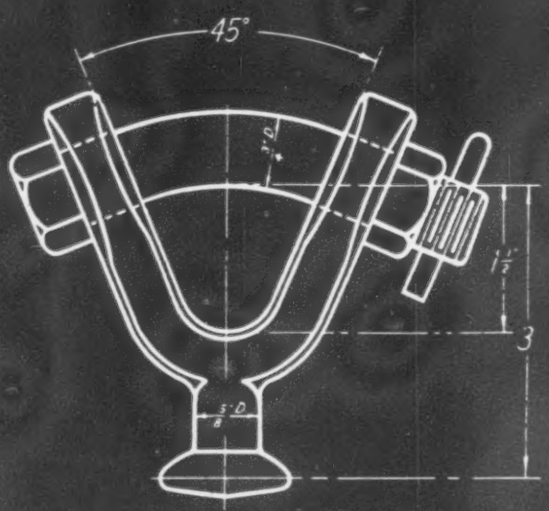

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ELECTRICAL WEST

SEPTEMBER, 1942
VOL. 89 NO. 3

This Once Bright World

More lights go out for the duration as Pacific Coast obeys new dimout order

DIMOUT has grown dimmer. First ordered for the California coastal area visible from the Pacific Ocean in May, followed by that for Oregon and Washington in June, the dimout rheostat was screwed down another turn by Public Proclamation No. 10 issued by Lt. Gen. J. L. De Witt, commanding western defense and the Fourth Army, on Aug. 5, 1942. One minute past midnight, Aug. 19-20, it officially became effective, although most of the order had already been complied with in the week or more preceding. The area embraced by the new proclamation reached far inland to high mountain ranges, and the control of light extended itself to decrease sky glow by at least 75% over all cities in the restricted zone. The first restrictions had been designed chiefly to eliminate point sources visible at sea.

First dimout had come at the request of the 11th and 12th, then the 13th Naval Districts, and was turned over to the Office of Civilian Defense, 9th Region, for administration. The new proclamation, coming from the Western Defense Command, carries the authority of Federal statute and violations become Federal offenses, under the wartime powers of the President and the Army. The OCD is still given the job of seeing that it is carried out.

Reason given for the deeper dimout—deeper in area as well as in dimness—was that "the present situation requires as a matter of military necessity that a zone of restricted lighting be established." In determining that necessity, recent tests were made in Seattle under C. T. Bakeman, and Los Angeles under Ted Shepard. Approximately 50% of the sky glow was caused by street lighting, 35% by signs, 10% by gasoline service stations and 4 or 5% by window lighting it was estimated in Seattle; 50% by signs and 35% by street lighting in Los Angeles.

Since the first order the street lighting situation had been handled expeditiously by the electric utilities. A reduction in sky glow or loom ranging from 25 to 30% was accomplished by the street light shielding done in coastal areas. But this was not sufficient to keep sky reflection of city lighting high upon the clouds from betraying from great distances the position of cities to high flying aircraft. The next step became necessary—that of reducing glow a full 75% by removal of reflected light from as many sources as consistent with public safety.

This required elimination of all sign and outline lighting, reduction of floodlighting of gasoline service station grounds to bare seeing minimum (1 fc.), more extensive civilian cooperation by the drawing of shades and non-use of such recreational facilities as lighted outdoor courts, playgrounds, swimming pools. It meant shielding of *all* light sources to prevent any upward light. Show window lighting of average intensity was exempted for a while. However, if subsequent tests indicate that such sources of illumination create too much reflected light from adjacent sidewalks, further restrictions may be expected.

Motor vehicle operation in the areas visible from the sea was more stringently restricted than by the previous order also. Drivers in any of the posted "visible from the sea" areas along the entire coast must now operate only with parking lights or headlights reduced to 250 candle power, no matter in what direction they may be traveling.

Economic consequences of this drastic restriction on lighting are incalculably serious and far reaching, as well as surprisingly complex. The OCD 9th Regional Illumination Engineer's office and those of his consultants in each state are bombarded with questions as to interpretation and advice. The proclamation itself, covering some subjects in too general terms, has had to be defined more accurately in order to guide compliance. Generally speaking, however, all such "bugs" had been found before the effective date of the proclamation, Aug. 20, because of intelligent organization and cooperation.

Electric utilities, standing to lose the most, tangibly and intangibly, by the order, took the situation without a whimper and volunteered their lighting salesmen and engineers to assist the very customers to whom they had sold better illumination, to reduce it, shield it, turn it off in many instances. To many a zealous lighting man this was "a hell of a note," but war is such.

Motion picture industry was also a sufferer, both in the showing and the producing ends. Theaters were required to black out their attractive outdoor signs, markee announcements of features, under-markee lighting, and then stand a reduced patronage from the general inhibition of night stepping-out which the dimout engenders. On the producing end the army has issued orders that outdoor production at night, requiring floodlighting equipment, cannot be considered to be "industrial processes" and thus permitted.

The oil industry when appraised of the order took immediate steps to reduce gasoline service station lighting, check and test the results, reduce again if necessary, finally arrive at means to accede to the 1 fc. maximum illumination permissible on all ground areas and under station canopies. This experimentation, done by the major oil companies, was reported to independent stations to guide them in compliance.

Beer and liquor signs, hung just inside the window glass of beer parlors, to come "within" the meaning of California State Board of Equalization rules prohibiting outdoor signs of on-sale liquors, under the dimout regulations will have to step back from the window a distance three times that of the height of the window. This will really put them inside the premises. It will also prevent the escape of light from such a sign in an upward direction.

Shipyards and protectively lighted areas about war industry plants were exempted but told to shield and revise lighting as far as practicable to reduce to a minimum light emitted upward. *Upward* was defined as light above the horizontal. Shielding of lighting units, use of louvers and spill rings and other means of control were being applied to such yard lighting as fast as materials were available. No attempt was made to reduce to 1 fc. such areas as were used for active production, however, the importance of the work being done outbalancing the risk.

In brief the proclamation, copies of which are posted everywhere in the zone of restricted lighting, orders that lighting be extinguished or controlled in such manner and to such extent as may be necessary to prevent aiding the operations of the enemy. That zone is illustrated in the map in color on page 43. Within that entire zone signs, commercial floodlighting, display lighting and lighting at amusement places must be turned off. Show window lighting of normal intensity (interpreted to mean not brighter than the average of other stores in that block or neighborhood) is still permitted, but signs and ornamental lighting inside such windows must be turned out, signs moved back, by subsequent interpretation, a distance equal to three times the height of the window measured from the pane.

Ground areas outdoors, (and skylights of homes or buildings are rated as such also), must not exceed 1 fc. at any point and all light sources shielded so that no light is emitted upward. Besides the service stations, parking areas, entrances to buildings and recreational areas, this is interpreted to include areas under canopies and markees but not open front stores and theater lobbies closed on three sides. Industrial and protective lighting are exempt from the 1 fc. rule but must cut upward light.

Traffic signals and signs are required to shield upward light; however in cases of below-eye-level signs and signals, shields which permit a maximum upward light of 6 deg. above horizontal are permitted in specific cases. Navigation lights and railroad signals are excepted from the proclamation.

So much for the general dimout. But in the extreme coastal area, visible from the sea at any point, still further restriction is imposed both on traffic and on civilian light use. All street and highway lights must be screened or shielded on the side facing the sea, all windows of homes, stores, offices or factories facing the sea must draw blinds or close venetian blinds so that the vanes point downward toward the outside. Industrial fires must be shielded; bonfires, parked car lights, flashlights and lanterns are prohibited, and vehicle headlamps dimmed when operated within such areas, whether pointed toward the sea or not.

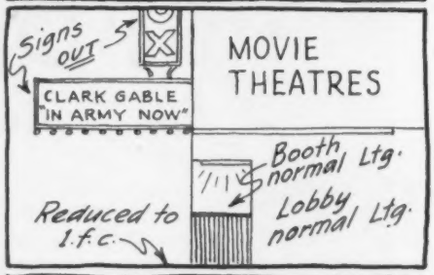
Vehicle headlight dimming requires that no more than two front lights be used, (either parking lights or headlamps or extra lamps especially equipped) emitting no greater than 250 maximum beam candlepower each, measured as 2.5 fc. on a vertical plane 10 ft. ahead of each light source. Dimming of headlamps is permitted by placing in series with the high beam circuit of each headlamp another lamp, under the hood, of such resistance as to reduce the high beam emission to the required low level. Shields or masks are not permitted on regular headlights, only on auxiliary vehicle lights. Normal tail lights, stop lights, license plate lights and where required, clearance lights are still to be used. Emergency vehicles of police, fire and ambulance departments will continue to use their red spot lights on emergency calls.

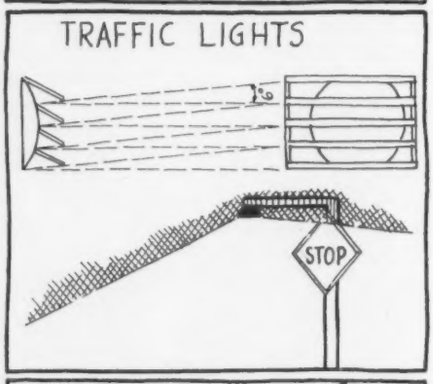
Compliance, it is expected, will be voluntary. Wardens and auxiliary police will aid in informing the public. Wide publicity by press and radio and posted proclamation reached practically everyone. Where violations require arrests the city, county or state law enforcement agencies will book violators en route to the U. S. Marshall, the FBI will investigate and the U. S. Prosecuting Attorney will bring the case to a Federal court. Penalties may include fine, imprisonment or expulsion from the entire military area.

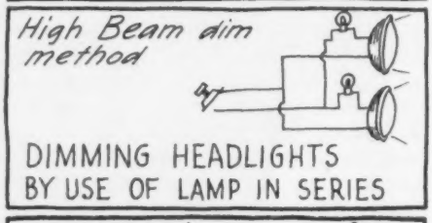
To advise on technical questions and to make light intensity tests the lighting sales and engineering personnel of the utilities, the members of the Illuminating Engineering Society, city electricians and engineers have been made consultants and advisors upon call from any citizen.

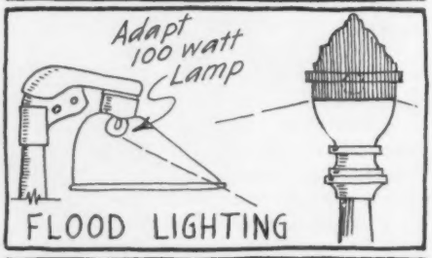
One of the most perplexing of the technical problems involved is the shortage of light meters capable of giving a reasonably accurate reading of intensities as low as 1 fc. The ordinary foot-candle meter is not very accurate at that low level. An ingenious and inexpensive device for measuring such levels by the shadow comparison method is being developed, to be made from cardboard and parchment and a single 10 watt lamp. It can be expected soon.

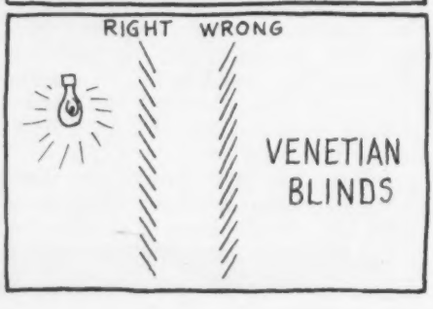
Ornamental Neon lighting near window—OUT
Sign inside window out—unless moved distance—3 x heighth of window.
STORES, BARS, RESTAURANTS











OPA Holds to March Prices

Wage scale adjustments, if any, await elections; other priority changes and further restrictions

PRICE control was stubbornly sticking to its March freezing date and nothing was being done to stabilize wage levels or to adjust prices to recent raises, awaiting, no doubt, November elections, as August closed on still tighter restrictions. Priority changes for the past month were relatively few, and predictions of a straight out allocation were coming from many sources. The Department of Justice was still carrying on its reform crusade to add legal timewasting to the burdens of war upon business, hitting the wire and cable companies with an anti-trust suit, the lamp companies with another. Fortunately the patriotism of the industry was not letting these boils deter it from all the war production of which it was capable.

Definitions as to just how price control applied to the construction industry were as yet only promised, but not worked out. In an industry in which the best brains have always failed to achieve price fixing of any degree, the government was finding itself in the same impasse. Just what was the price of construction in March, and for what project? For another and entirely different one in September, what bearing does the March one have? Sprinkle liberally with new wage scales and serve to taste. The formula has not yet been reduced to a regulation.

Service work, however, was brought definitely under MPR 165, at first vaguely, then by an amendment, specifically. Section 1499.101 states: "Electrical Appliances (small or portable, commonly used in homes, hospitals, institutions, offices, retail establishments or schools) maintenance, rental or repair of—" Those doing such repair work on appliances are required to have prepared and available in their place of business for the public or for OPA a statement of their highest prices or charges for such work in March 1942. Where definite prices were quoted, such as a scale for overhaul of certain parts or of an entire appliance, (say the wringer assembly of a washer, or replacing a heating element in an iron) such a scale is to be used

Where no definite scale was used but a materials and hourly charge was made for repairs, the statement must show what the rate was and what the materials were charged. In other words the statement must show the rate or the pricing method used, together with all discounts and differentials, (such as for certain classes of customers — other dealers for example). By Sept. 10, it is required that a copy of this statement be filed with the nearest War Price and Rationing Board. Transfer or sale of the business requires that the successor continue the same prices.

Provision is made in Procedural Regulation No. 5 for filing for an adjustment of ceiling prices, but the completeness of the information required indicates that only the most critical cases would stand much chance of adjustment, even to meet new labor scales.

Rewinding and repair and service work for industrial and commercial customers comes under No. 136. Labor rate for rewind work, machine work, rebuilding or repair, is to be the same as that in March. There is a "Dealer's Second-Hand Machinery Report," available at OPA offices, to be used in reporting inventory of all second hand equipment, additions to it, sales from it, or other disposition.

Time and Material construction is considered to be selling materials at wholesale to an industrial or commercial customer. Therefore electrical materials listed in No. 136, and it includes nearly all wiring materials and machines, are to be charged at October 1941 prices, which prices were to have been filed with OPA in Washington by Aug. 1. Labor rates per hour charged prior to Mar. 31, 1942 are to be charged now and also listed with OPA. If the labor charge was $2.50 per hour that is all that is to be charged now, in spite of increased wage scales since. Those who feel this will cripple them may file a protest individually under Procedural Regulation No. 1.

Utility Rulings

Utilities are not required to fill out and return forms WPB 843 A, B and C listing all excess inventories of copper products. A few such forms were sent to utilities by mistake because other forms are used by utilities in reporting.

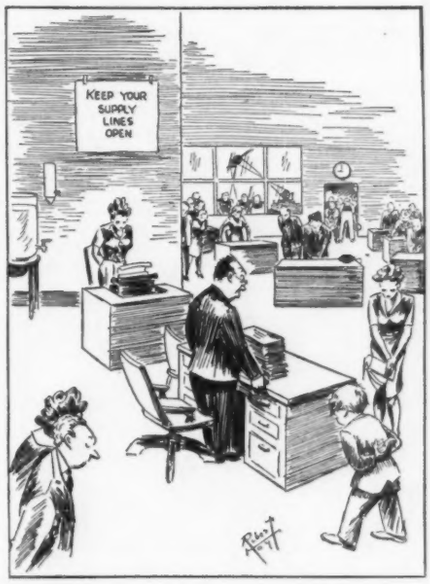
Federal Public Housing Authority, sponsoring all publicly-financed war housing, has instructed its field offices not to design homes calling for electricity for space heating, water heating or cooking except were there is no substitute. Electricity is to be confined to lighting and refrigeration.

P-46, the utility maintenance priority order, is almost certain to remain in effect through the last quarter of the year despite expansion of the Production Requirements Plan, Washington advice states. Meanwhile P-46 was amended to permit utilities to make service extensions for the Army, Navy and Maritime Commission upon direct order without clearance from Washington. This is to speed establishment of emergency patrol posts at danger spots.

Production of household electric meters is to be stopped after Sept. 26, and until then production reduced to 2½% of that during the year 1941. Also to save copper, fuse parts other than those carrying current, are not to use the metal. Rubber used for insulating wire and cable has again been restricted. Regrooving of tires without prior written approval is prohibited.

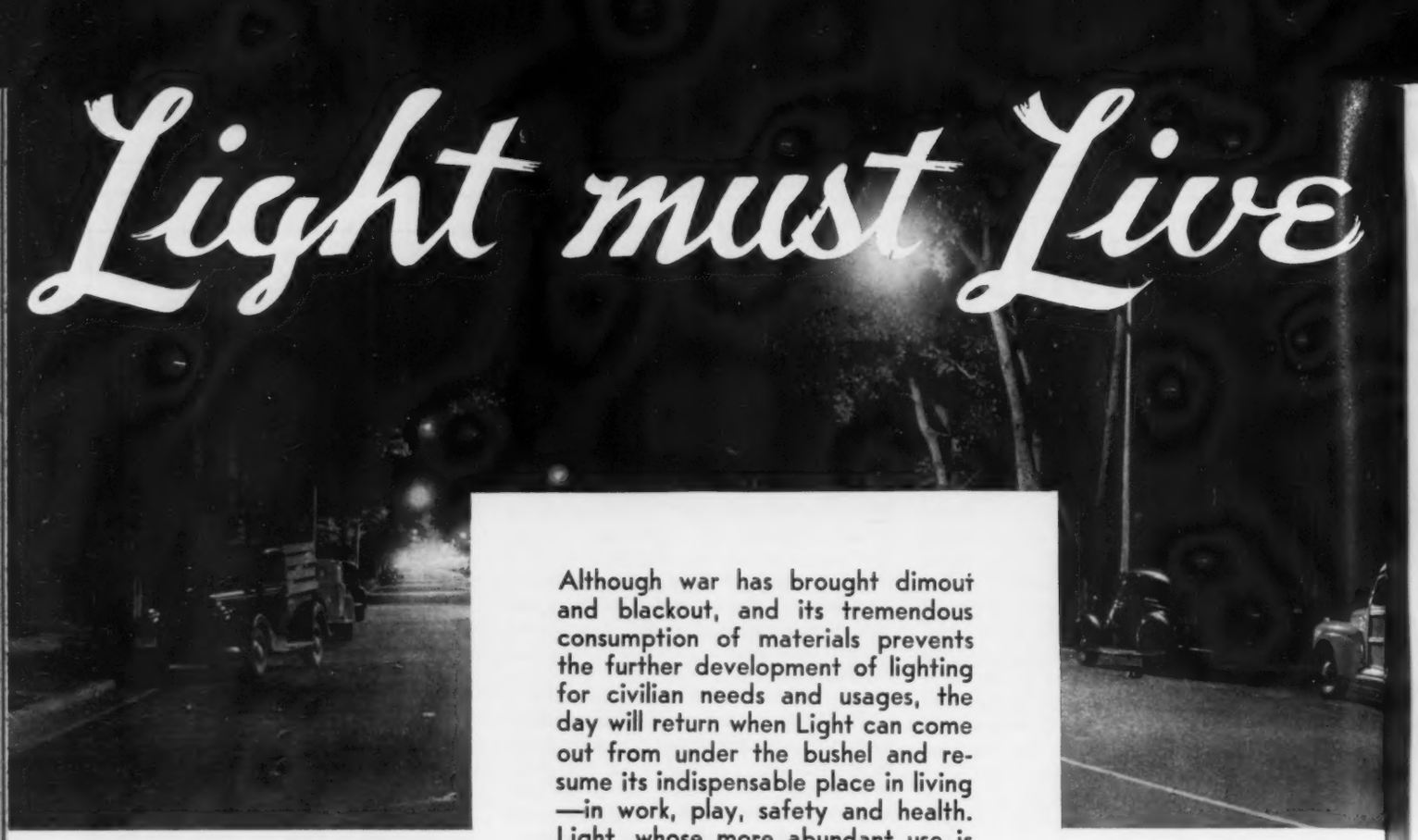
C'est la guerre. But progress on the world-scattered war fronts is beginning to pay Americans for their sacrifices.

● SHOWINGS of the color moving picture, with sound, *The Inside of Arc Welding*, by General Electric Co. have been increasing greatly as a result of a preview of the picture given to a large number of industrial executives in the San Francisco Bay region by General Electric on July 28. Since that time requests for re-showings to groups of employees engaged in welding have been continuous.



"Before opening the mail, let us pause the usual two minutes in silent prayer for strength to face the day's new forms and requirements" — "Passing Smiles," Thomas & Betts Co., Inc. house organ

Light must Live



Although war has brought dimout and blackout, and its tremendous consumption of materials prevents the further development of lighting for civilian needs and usages, the day will return when Light can come out from under the bushel and resume its indispensable place in living —in work, play, safety and health. Light, whose more abundant use is illustrated by these recent pre-war examples, has contributed so much to living that it must be kept alive until then. Darkness is temporary.

for Safety on the Streets

TAX burdened cities in the dimout area short-sightedly have seized upon Proclamation 10 as an excuse to "save" money by reducing street lighting even where it is not required. Poor economy in view of cost in lives and dollars calculated saved at 200 critical intersections in Los Angeles by Ralph T. Dorsey, city traffic engineer. At 20 intersections where records were tabulated, for a cost of about $8,000 for G-E sodium lamp equipment, the city saved the public $142,800 in reduced accident costs from night accidents alone, using National Safety Council evaluations of $11,500 per fatality, $425 per injury, and average city property damage of $25. Despite a 26% increase in daytime collisions at these 20 intersections, comparing a two-year period before and after installation, the reduction of 72% in night collisions brought about an overall reduction of about 45%. Only one sodium luminaire was installed at each intersection in most cases. Now, with vehicle headlamps reduced to 250 beam candlepower, or much less with some parking lights, the maximum of permissible street lighting should be maintained for sheer public safety. Tests show that a pedestrian in dark clothing cannot be seen by a driver in a car 50 ft. away by the lights of 250 beam candlepower headlights. At 30 to 35 mi. per hr. 50 ft. is close to the minimum stopping distance if brakes work perfectly and pavement is dry. This is no time to reduce street illumination any more than absolutely required by the army for defense of our shores.

On this page are typical recent applications of outdoor lighting to safety. Above, residential section of N. Virginia St., Reno, changed over last year from single pendant fixtures at intersections to 4,000-lumen Westinghouse units, 25 ft. above roadway, 16 ft. out from the curb, staggered 150 ft. apart. Below, left, 10,000-lumen General Electric luminaires, 150 ft. apart, for protective lighting along the fence of a war plant. Center, San Rafael, Calif., Fourth Street, relighted recently with 51 two-light, 6,000-lumen Westinghouse unit standards 23 ft. high, 118 ft. apart. Right, street intersection, San Fernando Rd. and Van Nuys, Los Angeles, at which six accidents occurred in the 10 mo. preceding installation of a General Electric sodium vapor luminaire. None occurred within the next 10 months

Many a dingy and dark old loft has been given a new lease on life lately to accommodate war offices. Below is shown what was done to change such a loft space, formerly lighted by 20 drop cords, to provide 35 fc. of lighting for a Navy office in the Central Tower annex, San Francisco. On 10-ft. centers 54 4-lamp, 40 watts each, fluorescent fixtures made by California Electric Supply Co., were installed by Bertrand Electric Co. to J. C. Cochran, maintenance engineer for Pacific States Bldg. & Loan Co., design. Old outlets were utilized and extra circuits run down between columns, fished over between joists to eliminate surface wiring. Inset below, shows how even a bank, usually a gloomy, ornate interior, hard to work in, was modernized with fixtures made by Strickley & Gerard, Los Angeles, using a center Holophane 500-watt unit, surrounded by 8 75-watt lamps in opal glass shielding, producing 25 to 40 fc. on working levels in the office space

for Brainworkers

IT took such long years of patient work and pioneering to lift the lighting levels for office work from bare seeing to comfortable, effortless, strainless visibility. The progress of light in the past few years must be held at these hard won levels by every persuasion possible. It will be all too easy to slip downward to gloom and glare as equipment shortages increase and breakage and wear take their toll. The stimulus of salesmanship used to compensate for this tendency to decline. The sale of improved equipment kept increasing levels. Without that stimulation it will be too easy to slump. Yet with so much more paper work to do, so much more intensive eye work in wartime offices, often night work or work with windows blacked out, it is more important than ever that light live.

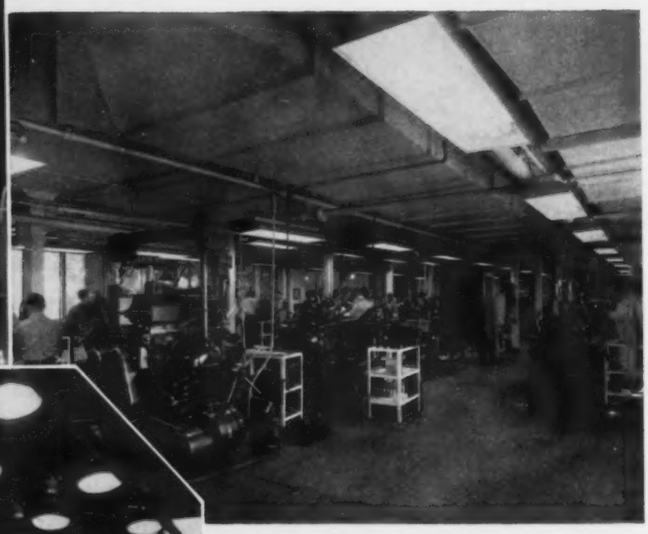
Architect and lighting engineer worked together (above) to harmonize 12 special ornamental Westinghouse Magnalux, 1000-watt luminaires with the design and appointments of the Pacific National Fire Insurance Co. general office, San Francisco. They are mounted on 16x18-ft. centers, 12 ft. above the floor and provide an average illumination of 32 fc. on desks. Below is the drafting room of the San Luis Obispo State Highway Division, in which 50 fc. of illumination is furnished over the drafting tables by continuous rows of 4-lamp, fluorescent, louvered Ruby Lighting Co. fixtures, end to end, suspended from the high ceiling to about 10 ft. from the floor. Illumination is excellent even at inner wall; where files and books require good seeing

Low ceiling office of Dean Witter Co., Oakland (above) 12x14 ft., was given adequate light (35 fc.) by two 2-3-500-watt indirect portable torchieres. Lighting planned by R. W. Bird, Pacific Gas and Electric

Replacing old enclosing globes, too few to provide high lighting levels, but too bright to tolerate more from a low ceiling, these 4-lamp fluorescent fixtures gave the offices of David Spencer, Ltd., department store, Vancouver, B. C., adequate lighting for close eye work

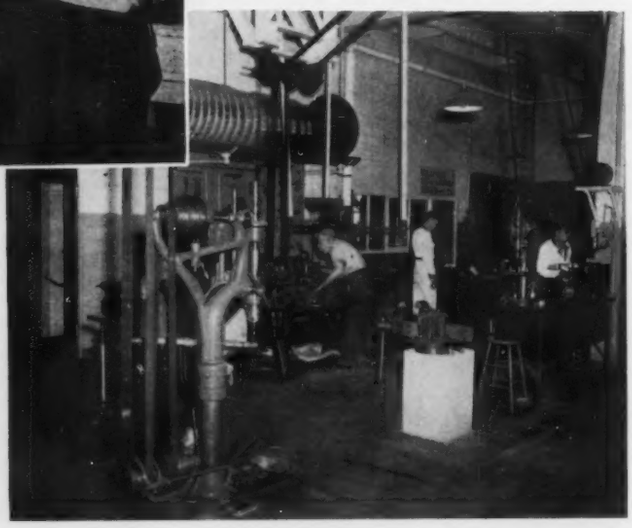
Light must Live for War Production

Urgent need for speed in production, reduced spoilage of critical materials, accuracy, safety to valued workmen, as well as 24 hr. plant operation, gave industrial lighting the chance it long awaited to prove what patient research had promised could be done. At Douglas Aircraft (left) 400-watt mercury units in Holophane reflectors, 8¼x15-ft. centers, 35 ft. from the floor, deliver 68 fc. after 6 mo. operation, 88 fc. initially. Below, Caterpillar Tractor, San Leandro, Calif., gets 40 fc. from 40-watt F lamp RLM fixtures, 8x10 ft. spacing, 8 ft. mounting height



Infrared lamps have speeded many operations. At center, Van Dykes speeded 350% and rejects reduced from 25% to 0, with $300 a month savings, at Westinghouse by use of a bank of 12 250-watt lamps, spaced in three rows, 9 in. apart, lamps 2 ft. apart. White cement floor of the massive Consolidated bomber plant, below, reflects up under wing surfaces some of the 40 ft. high "sky" of fluorescent industrial units, arranged in pairs along the beams. Austin Co. originated this floor reflector idea, which is particularly helpful in windowless factories whose entire lighting must come from high mounted sources such as in this typical aircraft plant somewhere in the West

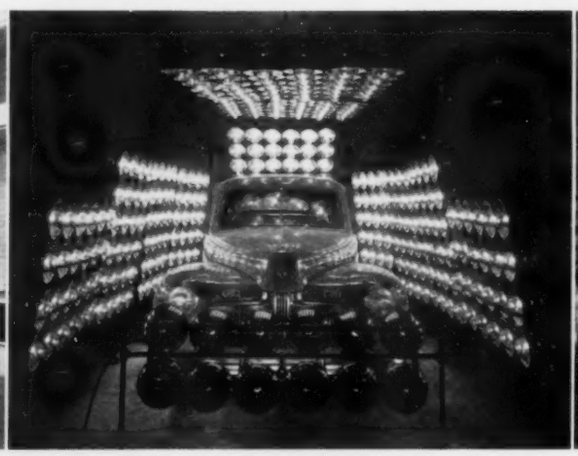
No less important is lighting to the small home industry now being converted to produce on subcontract parts used in larger war production factories. Such is C. Speck Motors Co., Sunnyside, Wash., whose automotive repair shop is working on war material. Recently Pacific Power & Light Co. lighting staff assisted in laying out new illumination for the shop, using RLM industrial reflectors with incandescent lamps, stepping up lighting to aid in meeting the critical specifications of such work



for Peacetime Hometown Industry

From peacetime examples came the lighting methods which were expanded to fit the bigger war jobs. After it is over, these lighting methods, developed further by war necessity, will return to peacetime application, such as these pictured here. At right, top, the relighted warehouse of Pacific Freight Lines, in Los Angeles, where 2-lamp, 40-watt F industrial units, in rows 20 ft. apart made so much difference in the sorting, classifying and handling of freight that the entire area was being changed over. Missent goods, because addresses and labeling cannot be read easily by freight handlers, prove costly. Otto K. Oleson installed it, Lloyd Gates, Bureau of Power & Light, designed it. Prior lighting was from bare 200 watt lamps. Another idea was the use of a reflector flood lamp on the portable cord used inside trailers while loading, making glare-free indirect light from the ceiling

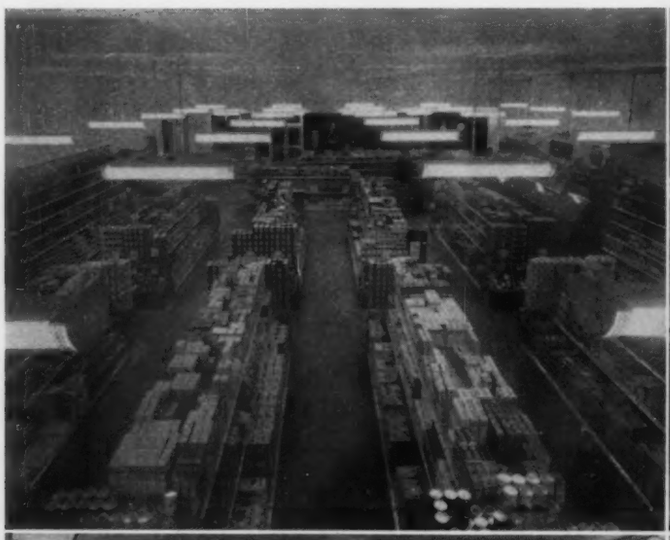
BEFORE steel became the priority metal it is today, whose end use must be in war production or nothing, it was employed to make stoves and cars and a thousand other things, many of them small. Even stoves can be fabricated in small factories, small compared to a bomber plant. Many a city has hundreds of such small plants, far too many with low ceilings, beams exposed, difficult to light. Washington Stove Works at Everett, Wash., improved seeing and with better seeing, production, when it installed twin 40-watt Mazda F lamps in industrial reflectors on 5-ft. centers over its assembly lines and benches. Now the low ceiling does not matter, and although reflectors are close to workmen, low surface brightness of the lamps makes much less glare than formerly. Average intensity is 50 fc. Below, Bakersfield Motors Co., Bakersfield, Calif., equipped itself really to do an automobile repainting job expertly and speedily. The paint spray room (at left) was equipped with five built-in, vapor tight, glass enclosed troffers containing twin rows of 40-watt F lamps, outside switching, forced ventilation. Drying (center) was speeded by adjustable, portable banks of infrared lamps and reflectors on rubber castors. At Block Manufacturing Co., Seattle, cutting tables over which live trolleys to feed portable cloth cutters had to have shields left in place, the twin F lamp industrial units were placed at right angles across trolley shields to obtain maintained 35 fc. illumination

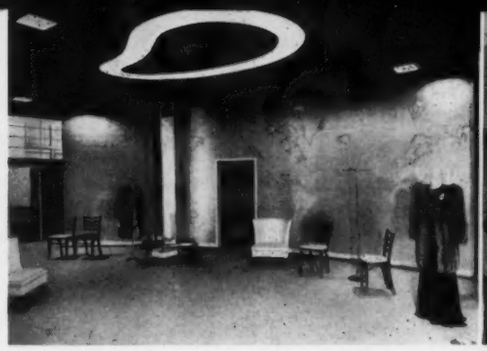


Light must Live

for the Stores of Today and Tomorrow

SIGNS are casualties of the dimout, but these at left may still brighten the night at inland Salt Lake City's Grand Central Market. These were installed by Young Electric Sign Co. The 22,000 sq. ft. interior is lighted by 180 300-watt louvred glass reflector units, installed by A. N. Sisam, electrical contractor. Beside exceptional illumination the Kelvinator refrigeration system installed by Flint Distributing Co. is extensive. Below, left top, is the Green Frog Market at Bakersfield, 83x42, with 14¼ ft. ceiling height, where 36 4-F-lamp units on 10 ft. 8 in. x 11-ft. spacing provides 43 fc. average. At left, bottom, is Neldam's Danish Bakery, Oakland, whose lighting was laid out by L. B. Craig, PG and E, to fit the character of the store yet concentrate light upon the display cases. In the ceiling mounted opal glass covered fixture are 16 40-watt soft white F lamps. At right below are two views inside the modernized Safeway store in Yakima, Wash. Beside general lighting from 31 300-watt units in glass enclosing globes which give necessary component of vertical illumination for wall shelves, the meat cases illustrated have 11 150-watt units in silvered mirror reflectors, and the windows, below, have 15 150-watt units in enclosing globes. Over the vegetable counters additional intensity is furnished by 150-watt lamps in aluminum reflectors suspended from drop cords directly over the counter on 36-in. centers. Exterior is floodlighted with 2 1,000-watt and 3 1,500-watt floods. The lighting was designed in cooperation with Pacific Power & Light Co.'s engineer, M. G. Kennedy





NEW construction—hence store modernization—is prohibited for the duration, but when it is again possible to rebuild, what a rush there will be. Even the well-lighted, attractive stores of today, some of which are pictured on these two pages, will be due for a complete freshening and modernization. Out of the lessons learned in such installations as these will come the techniques for this new bright world that eventually must follow

On this page, in rotation clockwise from top left to bottom left, are examples of modern store lighting techniques in the West. First, the Best Apparel, Inc., fur salon at Seattle, whose general lighting of 25 fc. comes from the irregularly shaped cove in the center. Down lighting over the fur display provided 50 fc. For the mirror niche fluorescent lamps provide 50 fc. Next two are in H. C. Capwell Co. department store, Oakland. First, at the escalator landing on the second floor, a display panel, lighted background from 12 20-watt F white lamps; spots on figures, 2 150-watt reflectors spots in ornamental domes; and behind the opal glass ceiling panel, 12 60-watt incandescents. Design was by Collins, of Capwells. The other Capwell picture, shows a portion of the second floor women's wear department, 40x75 ft., with a 15 ft. ceiling, in which 8 500-watt plastic bowl indirect units provide general illumination. Additional special lighting includes 78 25-watt lamps in 19 dress racks and background lighting for the display panels of 24 20-watt F lamps. The evening clothes department at the rear has 12 60-watt lamps, and four recessed ceiling units each have 150 watt lamps. At the right, top, the S. H. Kress & Co. store in San Diego, 80x166 ft. with 16 ft. ceiling, which has 35 fc. illumination on counters from four rows of 12 multiple control lens units, using four Holophane lens and four reflectors, with 200- watt lamps, plus one row of 15 similar units using two lens each. Opal glass sides illumine the ceiling from spill light. Modern silhouette sign and high intensity (320 fc.) window lighting at Lawson's candy store in Astoria, Ore., make the store outstanding in the community. Inside 45 to 50 fc. is provided at the serving counters, 21-30 fc. on show case tops, and 10 fc. in the booths. Below, right to left, are three southern California stores on Edison Co. lines. At right is Yorkshire's,, women's wear store in Beverly Hills, in which fluorescent lighted ceiling coves with Grand Rapids louver system, provide 65 fc. Center is Campbell's men's clothing department, Santa Monica, where fluorescent ceiling boxes furnish 50 fc. of lighting with blues in it for discrimination of fabrics in men's suits. Both the modern high intensity sign and the 75 fc. window illumination of Inglewood Furniture Co. may be dark now because of dimout, but Carl Matson, owner, knows that when he had it, it increased his sales because night shoppers were attracted to brilliant displays

Light must Live

for Recreation

AN outdoors people could well be expected to extend their hours of play and recreation after dark by illuminating the playfields and grounds, and there is scarcely a town in the West, now, without its softball field, its lighted tennis courts, its backyard badminton courts. In that area designated by Proclamation 10 as necessarily dimmed out, all such outdoor night play must be confined to the hours before sunset, for floodlighted fields are not permitted. The indoor sports centers, such as skating rinks and bowling bowls, however, still flourish. When peace comes again it will bring a great upsurge of long pent up want for outdoor night recreation. Cost of such illumination has been surprisingly low. In a recent analysis of the cost of lighting for Seals Stadium, San Francisco (above) where 300 Westinghouse 1,000-watt units are installed, for the four years between 1937 and 1940, cost was but 1.29 cents per ticket holder. At left is an example of the public swimming pools common to western cities. This is at Jefferson Park, Bakersfield, where Gene Gartley, electrical contractor, installed 12 standards, mounting two 500-watt reflectors each, and in wet niches, 22 400-watt Westinghouse Aqualux underwater units. For spectacular "aquacades" underwater lighting alone can be used. Below are two views of one of the exceptionally well lighted new bowling alleys, so many of which have sprung up recently. This the Downtown Bowl, at Eddy and Jones, San Francisco, operating these days of swing shifts 24 hr. a day. All public space is lighted by 40-watt, 3,500 white F lamps, usually in pairs, in simple reflectors. Alley lighting is as follows: Approach, open ceiling, ornamental, 2 40-watt lamps, 20 fc.; alley, in pairs behind coves, 10 40-watt F lamps; pin space, one 40-watt F lamp in a reflector over the pins, 150 fc. Each alley has Tele-E-Score equipment which projects the pencilled score record of each player onto a ceiling panel over the alley, in full view of the audience. Fouling is indicated by a photo-cell and light beam across the alley at the foul line. Interrupting this beam trips relays which sound a buzzer and flash a red signal light on the face of the pin mask. The building was designed by Architect Albert F. Roller, and Lyle E. Patton was consulting electrical engineer. Wiring was installed by Pacific Electrical & Mechanical Co., with lighting design by William Haluk, of California Electrical Supply Co. The upper picture is taken looking from the pin racks toward the concealed lighting coves over the alleys. The bottom picture shows the view from the alley approach, showing the approach lighting unit mounted under the score projection screen. In addition to alley lighting, foyer space too is fluorescent lighted, while office space, rest rooms, storerooms, toilets, entrance way and ceiling of the markee are lighted by incandescent. The bar is lighted by specially colored linear fluorescent sources behind ribbed glass covers. The facade is lighted by 187 ft. of 15 mm. diameter 30 Ma fluorescent tubing and is flashed by a 10-point flasher to produce a bowling ball and pin action effect. The bowl even has an operating and audience room for broadcasting. Likewise the premises were fitted with blackout facilities for continuous operation

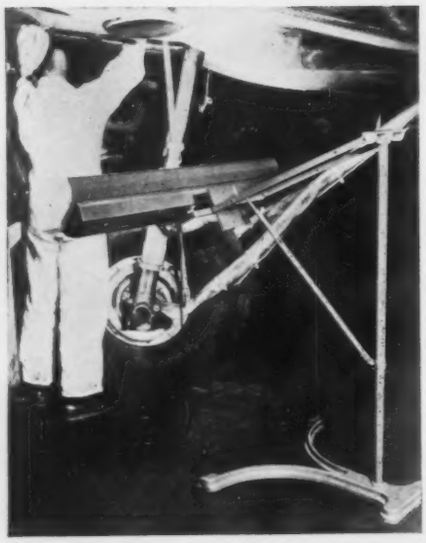
for Utilities and Banks

SELDOM are utilities in the position of shoemaker's children without shoes, for they use their own light medicine and set good examples for the remainder of the community. New light sources, new lighting ideas, new techniques and higher levels have been pioneered by electric utilities. Their performance and costs are thus accessible to customers from which to plan their own use of similar lighting. While this example-setting, too, is shelved for the duration, recent installations pictured here illustrate modern technique applied to them by their lighting designers

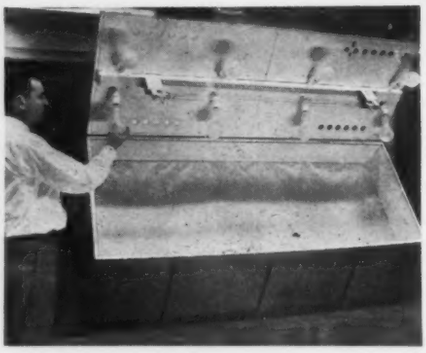
At top, right, the new Rodeo office of Coast Counties Gas & Electric Co., in which architect Lynn C. Duckering fitted 128 Curtistrip fluorescent units, using 30-watt, 3,500 white lamps in 32 of the Lamella roof ceiling sections, four to a section. Even using wedgewood blue ceiling field, he produced 35 fc. on desk working surfaces. Next is the windowless First National Trust & Savings Bank at La Mesa, for which A. O. Treganza, architect, and A. I. Benedict, San Diego Gas & Electric Co. illuminating engineer, designed a layout of 12 Curtis indirect fixtures for the 50x60-ft. area, with 18-ft. ceiling, spaced on 17½-ft squares. Over the work area 1,500-watt units give 27 fc. Over the lobby 750-watt units give 23 fc. Nanaimo-Duncan Utilities, Ltd., at its new head office and showroom building in Nanaimo, B. C., demonstrated both the suspension and troffer types of fluorescent lighting when it used Curtis 4-lamp Firefly luminaires over the showroom space and offices, and continuous row 2-lamp troffers, flush mounted, over the counter and cashier's office back of it. At the lower left, City Light & Water Board of McMinnville, Ore., used Daybrite 2-lamp, 40-watt hinged glass troffers over its office space. The troffers were run at right angles to the counter. In power houses and other utility plant structures too, lighting has been well planned. At center, the pumping plants of the Metropolitan Water District in southern California have a center line of 8 1,000-watt, high bay Holophane units, supplemented by 7 300-watt Holophane asometric refractors on side columns. Layout was by Frank Van Gilluwe. Right, bottom, Coronado office of San Diego Gas & Electric, Guth troffer lighted, has an average of 80 fc.

Light News

Special war needs are being met by the lighting industry in ingenious ways. The greater demands for light in all war production plants have caused inventors to bring forth material saving devices and ideas, new tools and lighting controls. Some of the most recent indicate the way in which this challenge to ingenuity is being met by individuals and manufacturers of lighting equipment



ADJUSTABLE PORTABLE FLUORESCENT service unit, first ordered by the U. S. Army for servicing planes at night, but useful in many industrial plants, particularly the aviation industry, has been developed by Lumidor Manufacturing Co., of Los Angeles. It is adjustable from 30 in. to 7 ft in height, and at any angle of a 180° arc without tools, is mounted on a balanced cast iron base and fitted with casters. It mounts two 40-watt F lamps, power factor corrected, in a baked enamel metal reflector



SAVING TONS of metals in equipment for large war industry plant lighting, a new ballast control unit and a new sequence starting circuit have been developed by J. H. Campbell and the General Electric Co. which permit the use of but one ballast with four 100-watt Mazda fluorescent lamps. Present 100-watt fixtures require a ballast for each two lamps. Two lamps on each phase of the new circuit start in sequence and operate in series, thus one ballast serves in place of two. It is designed only for use with 100-watt lamps on 254, 265 and 277 volts, common to war plants

DIMOUT SWITCH for traffic control signals during a blackout has been devised by the General Electric lighting division. It allows illumination of the entire lens instead of a reduced area, which makes for greater traffic safety, yet the light is of such low intensity it is not discernible from the air. Consisting of a transformer and single pole switch with two positions, one reducing the lamp voltage, it can be attached to the base of the controller cabinet. The shield above lens cuts upward light

JUMBO LUMINAIRE of non-critical materials has been made at Nela Park by General Electric Lamp Dept. engineers. It makes use of the new 3,000-watt mercury tubular lamp and a battery of 8 200-watt inside frosted filament lamps and produces 150,000 lumens from its 4,600 watts consumption. The jumbo fixture is constructed of fiber board with a bottom of ordinary tracing paper to seal the unit and keep out dirt as well as diffuse the light. It measures 8 ft. in length, 4 ft. width, 2 ft. depth

DISCARDED LIGHTING ARRESTORS can be made into lighting reflectors by cutting a hole in the top and fitting a weatherproof socket to them. A coat of white paint helps, Tom McDonough, of Central Arizona Electric Light & Power, found. He used them for photographic equipment, and found they could be used for yard lights or for general purpose utility lights anywhere

LAMP ADAPTORS to reduce lamp sizes from mogul base 1000-watt size to medium base 100-watt, were drawn from every available stock by oil companies for their outdoor service stations upon the dimout order. More than 15,000 adaptors were called for in the San Francisco bay district area alone

HYGRADE-SYLVANIA CORP. has decided to concentrate upon the single name SYLVANIA, to label all of its lamp and lighting fixture products. The corporate name for the company is Sylvania Electric Products, Inc.

STERILAMP EXHIBIT board has been on exhibit at the 207 So. Broadway main office of the Los Angeles Bureau of Power & Light and has started a tour of the five neighborhood branch and 15 community branch offices of the Bureau, spending two weeks in each. It was prepared by the Electrical Sanitation Sales Co., of which W. C. McHenry, former Sterilamp specialist for Westinghouse, is manager. In the photograph are Al Baumhover, sales display manager for the Bureau, and Mr. Penn, an appliance dealer

COLD CATHODE fluorescent lighting in continuous tubing now has an association of manufacturers and contractors known as the Fluorescent Lighting Association

LUMILINE LAMPS cannot be had now without turning in an equal quantity of old lumiline lamps because of the critical materials they contain. General Electric has announced this new policy which puts the lumiline in the same class with the tooth paste tube which shares the same bathroom with it

EMEA *Dope Sheet* — *Edited by Howard C. Park*

EMEA of So. Calif.

Methods for Cleaning Ball Bearings

Cleaning a ball bearing which has been in service may be accomplished by any one of many processes. Whatever the process employed, there are certain precautions which should always be observed.

A bearing should always be protected against the accumulation of dirt, foreign particles or moisture from the time the bearing housing is opened for removing the bearing until it has been reassembled and ready for operation.

Immediately after the bearing has been removed from the shaft it should be protected by one of the following:

1—Placing in clean solvent.
2—Placing in clean light oil.
3—Wrapping in paper.
4—Placing in dust-tight receptacle.

Too much emphasis cannot be placed on cleanliness of work bench, tools, solvents, oils, hands, compressed air (if used), or any thing with which the bearing may come in contact during the process of cleaning.

Cleaning Solvent

The choice of a suitable cleaning solvent may depend upon the condition or consistency of the grease which is to be removed from the bearing. One bearing manufacturer may recommend a certain cleaning solvent while another manufacturer recommends still a different solvent. The selection may depend somewhat on personal choice.

The solvents most commonly used are:

1—Gasoline (free from lead or anti-knock compounds).
2—Carbon tetrachloride.
3—Gas and carbon tetrachloride mixture.
4—Mineral seal oil.
5—Light lubricating oil.

Gasoline is quite frequently used to clean ball bearings. But, because of the fire hazard entailed, other solvents are generally preferred. If gasoline is used it should be free from lead and anti-knock compounds.

Carbon tetrachloride is a very good cleaning solvent. The principal objections to the use of straight carbon tetrachloride are its rapid evaporation and the film deposit remaining on the balls and races. Another objection to its use is that it will absorb moisture and frequently contains water. Under war conditions it is also difficult to obtain.

A mixture of gasoline and carbon tetrachloride forms a very effective solvent. The carbon tetrachloride will remove the fire hazard. However, caution should be taken not to use the solvent, if it has been permitted to stand for a period of time, without adding more carbon tetrachloride. Carbon tetrachloride is more volatile than gasoline. Consequently, it will evaporate first, leaving the gasoline, thereby restoring the fire hazard.

If the grease has become dry or caked in the bearing it may prove very difficult to remove. When other solvents and methods have failed satisfactorily to dissolve the grease, one of the following is sometimes used.

Soda-soap grease may be softened by soaking in a hot oil-water emulsion.

Lime-soap grease may require a more drastic treatment. A hot solution of any non-corrosive petroleum solvent, which will emulsify in water, may be required.

If either of these processes is used, it should be followed by a thorough flushing of the bearing with oil—all traces of moisture should be removed.

Cleaning Procedure

The bearing should be allowed to soak for a time in the oil or cleaning solvent.

It should then be sloshed about in the solvent—without rotating the bearing—until the grease becomes softened and washes out.

If the grease has become dried out to the extent that this treatment is not sufficient to dislodge the grease from the bearing, a hot oil bath of 140 F. to 160 F. may suffice to soften the caked grease so that again by sloshing the bearing in the solvent the grease may be readily removed.

Compressed air is sometimes recommended for cleaning the bearing after it has been soaked in a solvent. This is somewhat of a dangerous procedure, as compressed air frequently contains dirt, metal or rust particles. Moisture is almost always present in compressed air. If compressed air is to be used, suitable traps and filters should be installed in the lines. Another danger of injury to the bearing is spinning the bearing by the air force. A perfectly good bearing may be ruined by the lapping done with the dirty solvent. Also, excessive stresses may be created by the high speed frequently produced. Also the bearing may be run dry, thereby subjecting the balls and races to danger of spalling.

Some manufacturers recommend the use of a stiff brush to assist in dislodging the caked grease in a bearing. The brush may be safely used in cleaning the bearing housing, lock-nuts, etc., but if the brush is soft enough to be of any value in cleaning the grease out of the bearing, it introduces the hazard of bristles breaking off and lodging in the bearing or catching in the ball cage and being pulled off. At times it is very difficult to remove all particles of the bristles from the bearing.

A very effective method of cleaning bearings is by washing with a pressure stream of cleaning solvent. This method will minimize the danger of mechanical injury to the bearing. A small pump with suitable fittings and fluid tank will provide pressure to force a stream of solvent over and through the bearing. An adjustable spray nozzle may be effectively used. A filter should also be provided in the system to remove the dirt, metal particles and old grease from the solvent. All angles of the bearing may be subjected to the pressure stream.

After a bearing has been thoroughly cleaned it should be placed in a light oil bath and thoroughly stirred about to remove all traces of moisture and solvent that may remain in the bearing. It may be advisable to allow the bearing to remain for a short time in the oil bath to insure the dissolving of the solvent and removal of moisture.

If the bearing is not to be immediately reassembled in the bearing housing it should be thoroughly covered with a heavy grade of lubricating oil and wrapped in an oiled or plain paper.

Cleaning Fundamentals

The principal fundamentals to be observed in the process of cleaning a bearing are:

1—Keep bearing covered as much as possible.
2—Use clean tools, bench, etc.
3—Use clean solvent and oil.
4—Be cautious with inflammable solvents.
5—Avoid dirty and damp atmospheres.
6—If compressed air is used be sure filters and traps are in line.
7—Use of brushes should be avoided.
8—Do not unnecessarily rotate dirty bearing.
9—Do not spin bearing with compressed air.
10—Remove all moisture from bearing.
11—Remove all traces of solvent before re-greasing.

Selling *WAS* Fun

Let's do it again when the mess is over and normal living returns—meanwhile fond memories

By William G. Clary

An Ex-Bell-Pusher

YOU won't find it in the books. A lot of them have been written about selling, too. Perhaps too many. By far the richest reward selling offered was the laughs. And the dough wasn't hard to take either.

I'm not attempting to write or sell a sales manual or sales course, only to give the humorous side of actual selling, the extra dividend. Very often that contains more sales insight than any number of made-up examples in the ordinary sales text book. After 22 years of selling I find that all books and courses make the subject too intricate, when it is really very simple. For instance—(and naturally fictitious names are used although every incident quoted "really happened."):

Joe Smith was one of the best salesmen I have ever known. He had been selling for 20 years for a utility company in southern California. His quick thinking was once put to the test while breaking in a junior salesman whom we will call Larry Simon. Larry was a former taxi driver, a big, rough fellow who for some inexplicable reason decided that specialty selling was his life work, and he was willing to learn "from the ground up." In that era of teaching, a junior salesman rode around with a senior salesman, keeping his mouth shut and his eyes and ears open. It depended on himself how soon he would learn what it was all about.

Their first call was on a French woman. Joe immediately established friendly relations and began selling electric cooking by telling her that his mother was French, and describing all the luscious French dishes which the electric range would turn out so beautifully and with so little effort. Eventually the lady bought an electric range. She couldn't help herself. Joe had decided to sell her, and if the first argument hadn't closed the deal, he would have tried something else.

The next call they made was on a German lady. At that home, Joe's mother was German, and he followed the same procedure. Needless to say he sold the range. The third prospect was a Japanese. After taking one look at her, Larry hurried out to the car and came back with the jack-handle. He stood right back of Joe while he gave his sales talk. This was intended to convince the Japanese husband that his wife could stay in the fields a few hours longer every day if they had an automatic electric range. Another sale.

As the two started back to the car, Joe asked Larry what he was doing with the jack-handle, and Larry replied: "I was just waiting for you to tell that woman that your mother was a Jap, and then, Brother, I was going to wham you right over the head."

Then there was the night that Joe took ME with him on a call in Newton It was a cool night and we were in a convertible car with the top down. When we arrived at the home, Joe gave me a long song and dance about his heart; said it had been acting up and he didn't want to do any drinking as it caused the old pump to flutter unrythmically or something. The people were Italians and if both of us went in they would bring out the "vino" and *I* would be unable to refuse and so he would have to drink too. So please would I wait in the car and he would make it as quickly as possible. Hours later he staggered out to the car where I sat freezing. He was full of wine and it didn't seem to affect his heart any save that it was very light because he had made a sale.

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On another occasion the little word "why" made a sale for us. We had reasoned that if your product fits a need, and you have imparted the information but the customer says "no" there is a reason, and you have a right to know what it is. Our sales manager, however, insisted that we should never ask the customer "why." It might hurt the power company's public relations. But inasmuch as it was *our* time, effort,

gas, oil and tires, we talked it over and decided to ask the fateful question. The opportunity soon came.

Our very presence on this lady's porch asked her to buy, but she started in with the usual line about not being ready yet, and when she was, she would let us know. Very timidly I asked "why." I never heard three letters bounce around a room as that little word bounced around this one. It was a large, old-fashioned place. I was pale with fright and I held my breath waiting for the explosion. It seemed to affect the prospect the same way. She looked startled and a trifle indignant, but finally said: "Because I haven't the money, young man."

She knew Joe but had figured out that I was a "city slicker" sent out by my company to high-pressure her into a sale.

Joe suggested: "You can buy on time," but again she said, "No," and again I asked "why," but this time a little softer. We naturally expected her to bring up the usual complaints regarding high interest, etc. (what we called in those good old days "carrying charges") then we were prepared to offset these arguments by picturing that poor little roast shrinking away to nothing with her present equipment, her frequent bills for redecorating her kitchen, replacing the often-washed curtains; but she had none of these excuses. It was a new one.

We could see that she was a well-educated woman, rather above the average in intelligence, so you can imagine our surprise when she said: "I don't buy on time because I belong to a religious sect which believes that if the Lord should come and we owed money, we would not be allowed to go with Him."

A laughable answer, maybe, to those who believe otherwise, but politics and religion are the most serious factors in most people's lives. A salesman cannot afford to treat either with disrespect. Any of you who knew Joe will understand his next move. He calmly took a contract out of his pocket, filled it out, and across the face of it wrote: "If the Lord comes back to earth while this contract is in force, it is hereby agreed that contract is paid in full." And she signed on the dotted line!

After all, why wouldn't she? Her last objection was removed. How many deals we have lost because we did not probe into the "why" of the refusal! Of course Joe figured that he had made himself about twenty dollars in commission, but I think he earned it twice over trying to explain the deal to the head office.

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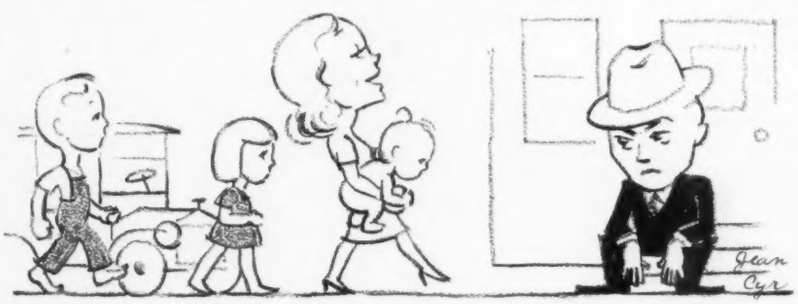
Listening to successful salesmen selling, I have noted many instances of mental Jui Jitsu, which, after all, is the salesman's best equipment. For instance there is the salesman who makes his customer choose between two articles —not whether to buy or not to buy but whether to take the lower priced or the higher priced. One time I watched a salesman's tactics in the case of two refrigerators. The couple chose the "standard" because it was cheaper. Naturally the store wanted to sell the "de luxe" and the salesman wanted to make



ten more dollars on his commission. This was his sales talk:

"Now I have convinced you that this refrigerator will pay for itself over a period of years, haven't I?"

The customers agreed.

"Well, if I offered you a free trip to New York, you to choose the mode of travel, how would you go: in the chair car, with a lunch basket, or in the pullman with meals in the diner?"

The couple looked at each other. "First class" they finally answered.

So he signed them up for the de luxe model just because he knew how to ask a question which made a mental picture they could visualize.

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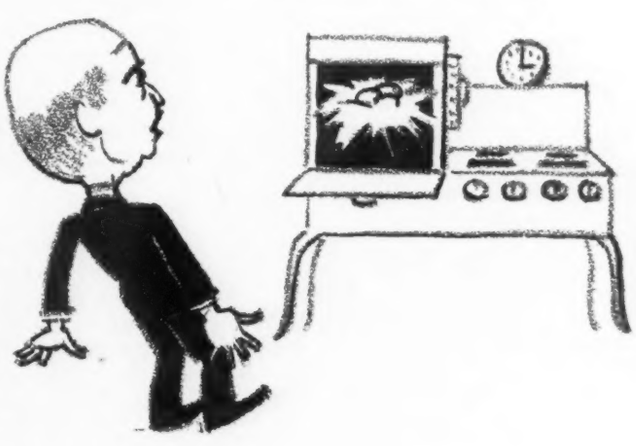
I learned a choice bit of business on the first call I made in one of our near-by beach towns. Having been given a range prospect named "Rathburn" I found in my pre-approach work that he was the highest powered realty closer in Southern California. This was in the days when people were loaded into busses and taken to see a new sub-division under the guise of a pleasant trip. After the luncheon served in a tent, there was only one way to get out and that was through the "sweat rooms." If no one else could sell you, Rathburn finally took over, and if you had owned a dollar when you went in, it was invested in real estate when you came out.

I knew I couldn't talk to a high-powered salesman like that, so I went to see his wife. She was very agreeable but sank my ship by saying: "You'll have to come back tonight to see Mr. Rathburn." Well, that evening I drove by the house twice, hoping I'd drop dead or something—anything—to save me from that call. Finally I pushed the door bell, card in hand, heart in mouth, about like "Al" Pearce does, in his characterization of "Elmer Blurp." A man opened the door. He had all the personality, hypnotism, mesmerism, etc. that one would need to do his work but he reached out and grabbed poor, quaking ME by the hand and said: "Oh, a high-powered range salesman from the So-and-So Company. Come in."

I was so scared that I told the truth. I explained that I was no salesman, and knowing what kind of work he did I wouldn't presume to try to "sell" him anything. I only wanted to tell him and his wife about electric cookery. They were both pleasant and sat down at the table with me.

It was an ideal situation for several reasons, and so let's digress for a minute and cover them. All women fall into two classes—they are either good cooks or bad cooks. If a woman is a good cook, her husband is so proud of it he will boast, and will buy her anything she wants. If she is a bad cook, he will buy in the hope that the darn thing will perform miracles and he'll get something decent to eat. Men will always buy more expensive appliances than women. Women have a false sense of values. To prove it, look at that 25c egg beater your wife is using. It pinches



her hand, it rubs off, and it's generally inefficient. If her time is worth anything, the hours she's fooled with it would buy dozens of new ones.

So here I sat at a table with agreeable Mrs. Rathburn and her quizzical husband with a catalogue on the table before us. We used a catalogue in those days for several reasons. The range looked larger in the pictures. We never had adequate displays, and the catalogues were made as presentation books, so you told *all* the story once—and only once.

When I had finished selling electric cookery to them, I tried to figure out in my mind what kind of a close I'd have to make to this high-powered real estate closer, but being panicky I merely pointed out the model she liked and asked: "Will it be right hand or left hand oven?" You see, we had black and white ranges and right and left hand ovens then. We walked out into the kitchen, all three of us, and Mr. Rathburn said: "A right hand oven will fit better."

I just about dropped dead, but revived enough to write the order, grab my hat and his check for a hundred dollars, and make a hurried exit. But he detained me a minute. "Young man," he said, "you are either the biggest liar I ever heard or the best salesman. I wish my lots had right and left hand ovens."

From then on I placed the sale on the customer's balance, and have always been glad I met Mr. Rathburn.

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When I first started to sell I always looked appraisingly at people and made up my mind what they could afford. One day I had a prospect at Lomita, went down and found a four room house, unpainted, right in the oil fields where rent would be cheap. There was no one home, so I waited a little while. Finally a large Cadillac sedan drove in, a blonde woman got out, and the kids started falling out of that car until it looked like a movie comedy. "Aha!" I said to myself, "a typical flapper; gets home a few minutes before her husband and grabs the can opener; spends all his money riding around in a big car; credit no good. Poor devil! I know that he makes about $6 a day at Union Tool."

Having sized her up, I naturally wanted to sell her something within her means, feeling sorry for her husband, and I recommended a four-burner, black and white range, exactly like the all white one she wanted but one hundred dollars cheaper. She wouldn't have the black and white, so I suggested that I should come back in an hour and talk to her husband. He also liked the all white range and as I looked out the window to find something else to talk about for a few minutes before making a determined effort to sell them the cheaper article, I noticed that the oil well next door was shut down and men were pulling the pipe.

"I'll bet you're glad that thing is shut down so you can get some sleep," I remarked.

Imagine my surprise when he said: "No, that's my well and every time it's shut down for 24 hours I lose $30 in oil royalties."

Now you know which range I sold them. I signed them up in a hurry on the expensive model, and from that day to this I have acted as if *all* my prospects own oil wells. At least I let them judge for themselves what they can afford. Selling is like that.

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Another good salesman we will call Tom Lund. Before World War I Tom was an actor, and a good one. Coming out of the army, where he had been shell-shocked, he stuttered. Naturally he turned to selling, for, after all, selling is acting. If ever I have to come back to earth as a salesman, I hope I can stutter. I never saw anyone who could sell as easily as Tom. Words being hard for him to get out, the kindly customer would take them right out of his mouth. He would start to say: "An electric range is coo—, coo—," and the lady would finish, "cool." Or he would begin: "An electric range is cle—, cle—," and she pitying his handicap, would add "clean." We used to kid Tom by telling him a wholly fabulous tale. We said that a lady had asked him when she might expect delivery and he had answered: "Why—why—, oh hell! I could have it out there before I could tell you."

To prove what I have said about Tom's salesmanship, he sold a "Regina" vacuum cleaner each day for a year, and the next year sold a "Hoover" cleaner each day for a year, and stayed in the same county. I have met salesmen who could sell a cleaner a day, but they couldn't stay even in the same state. One day at a cooking school in Saticoy I said to a prospective customer: "Mr Lund will call on you in a day or two." She smiled. "Yes, and he will probably sell me an electric range. You know he sold me one make of cleaner and then sold me the idea that it was too heavy to carry up and down stairs, then sold me a second cleaner."

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Credit reports used to be very much longer and more complicated than they are now. So were sales meetings. One night, on the way to a sales meeting I stopped to sell an architect six electric refrigerators. When it came time to fill out the voluminous and detailed credit report, I was very much surprised to have the architect stop me and ask when I had had a bath last. I assured him that it had been very recently, and asked why he wanted to know. He answered that from the questions I was asking him, he thought maybe he would have to kiss my feet in order to get the refrigerators.

I almost dropped dead, and a certain supervisor and sales manager never forgave me for telling the experience at the meeting that night.

●

They used to raise the price of a range $10 and then allow $10 for the old equipment, which was junked. The worst bawling out I ever received was from a supervisor who claimed that I was giving $10 for ranges that were not worth 10c. He saw the mote in his brother's eye but not the beam in his own. All the time he was talking I could have told him—but didn't—that the year before, when he had been selling, he had turned in one range three times, and on the last occasion, when the storekeeper opened the oven door, he found a hen's nest inside the oven!

●

From watching successful salesmen work, I have decided that selling should be simple and easy. One of the world's greatest authors gave us the secret of selling as well as the lesson she was trying to drive home, when she said: "The closed hand cannot receive." No, selling is service. (Yes, I know that one too. I was raised on a farm.) This selling service is the open-handed kind. You open your hand to give. Figuratively you do the same thing when you give them service. You help your customers with their problem of what is best to buy—forgetting self and commissions.

And your hand is open to receive the order. No need to worry about what to say and when to say it (after you know your product down to the last detail) for selling is giving.

Perhaps the "good old days" will never come again. If not, we shall have whatever acquaintances and friends our selling methods deserve. Who knows how many hospital bills have been saved by the introduction of washers and ironers; how much suffering by non-explosive water heaters; how many accidents to children by having them play on floors that have been vacuum cleaned; how much health and happiness has been assured families by the new, vitamin-saving ranges; how many lives have actually been saved through keeping foods in modern refrigerators!

Salesmen, I salute you as professional men. God save you from the alphabetical agencies, and grant that some day we may all be able to sell again! In the meanwhile try to keep your sense of humor . . . for selling is like that.

Wartime Mart Seeks Answers

Conclave speakers give dealers facts on which to base today's decisions, chart course for tomorrow

HOW OPA machinery is functioning in the retail field and what the future may hold for dealers who manage to survive present restrictions on business were topics discussed at the Western Merchandise Mart's Fall Market in San Francisco Aug. 3-8.

Dr. Merle Fainsod, director of the Retail Trade and Service Division, OPA, Washington, D.C., was the speaker at the industry dinner Aug. 4 and one of the experts on the discussion panel, "What's the Answer?" which followed. Bonnell W. Clark, of Pittsburgh, vice-president in charge of sales, Westinghouse Electric & Mfg. Co. addressed radio and electric appliance dealers at the annual dinner on Aug. 5.

That price stabilization is essential to victory and however onerous government regulation may be, it is preferable to the evils of inflation were points stressed by Fainsod in a talk in which he sketched the pattern of widening curtailment ceilings since the first meeting with the refrigerator industry in July 1941.

Revision of the General Maximum Price Regulation last April necessarily created problems, which are still with us, Fainsod said. Most difficult of solution, he stated, were three:

(1) Lack of a satisfactory pricing method in the ceiling order. Here the May 18 deadline offered a period for adjustment, with authorities trying to tailor the act to suit particular needs, he pointed out. The flow of regulations, he explained, is designed not to multiply the business man's burdens but to enable him to live with price restrictions.

(2) The order caught some retailers in a position where they were out of line with their competitors—some had lagged behind in price adjustment; some, like the mail order houses, were "caught with their catalogues down." With these out-of-line cases delegation of decisions to state or district offices was found helpful, he explained.

(3) The "squeeze" on customary margins. Retailers as a class had lagged in price adjustment and with increased transportation costs and increased costs brought about by substitutions, they were frozen in a position where they felt a "squeeze." Here OPA officials are seeking more efficient operation and wherever possible are forcing manufacturers and wholesalers prices down to "roll back the squeeze."

Out of Fainsod's talk and the panel discussion loomed the thought that despite a willingness for sacrifice on the part of retailers and manufacturers, despite OPA's attempt to iron out difficulties, some form of price stabilization on farm commodities and wages, as well as increased taxes to draw off excess purchasing power, are essential to the final success of the program.

Panel Discussion Lively

With George W. Fitch, managing didector of the Retail Furniture Assn. of California and the Western Furniture Conference, as moderator, the panel discussed topics submitted previously in writing. Government was represented by Dr. Fainsod, S. C. Griswold, regional priorities manager, WPB, and Frank H. Sloss, regional price attorney, OPA; industry by L. J. Breuner, president John Breuner Co., Oakland, and Walter Baumhefner, general manager, H. Friedrichs, San Francisco.

That retailers, despite their desire to comply with the regulatory order and aid the war effort, fear socialization of the industry was evident in questions submitted to the panel. To the question, "What assurance have we that upon conclusion of the war these drastic regulations will be removed?" Fainsod replied that a provision for its end one year following the war's end was written into the act and that the authorities regard price control as a disagreeable necessity. (Previously in his talk, he had declared price regulation to be an emergency measure designed to disappear with the emergency.)

Burdensome and expensive paper work required of retailers came up for discussion and hope was given by government representatives that some of the forms might be simplified, that an actual move to that end was on foot. Price posting had been seen as a help to retailers, Fainsod reported, and profit information was necessary to the "roll back."

Other controversial topics aired on the "Round Table" concerned governments buying—direct from factories at wholesale—goods which would be sold in turn to defense workers; victory models and the need of a mark-up even on such units; chances of an inventory control at the retail level (Fainsod stated that a committee was covering the country to study this question and a report would be forthcoming). From the government men came the cheering statement that large stocks of deluxe refrigerators now frozen but unwanted for defense housing might be rationed.

As for the furniture industry's place in wartime economy, it was estimated by OPA speakers that 40% of peacetime capacity was essential today.

B. W. Clark (right) with C. A. Dostal, Westinghouse Pacific Coast manager, who presided at the Mart dinner Aug. 5. The picture, taken the night before, shows Dostal receiving the Westinghouse Order of Merit, service award

Clark Sees Bright Future

Conviction that a continuance of the unity and team play which built the electric industry will aid it in meeting today's desperate conditions was expressed by Bonnell Clark, who pictured a rosy future after the war, provided the ideal of electric living is not allowed to die. To keep faith with the people who own electric appliances and to preserve a business which has taken hard work and millions of dollars to develop these appliances must be kept at work for the duration, he stated.

Seeing in the Western states the promise of a peacetime business far brighter than in many other sections of the country, Clark sketched the post-war opportunities of the electric appliance dealer who had managed to hold his place in the merchandising structure. A huge replacement market; a horde of "new rich" with a backlog of "wants;" a vast supply of power unleased at rates designed to keep generating plants loaded will contribute to prosperity for the appliance dealer when production starts again after the war, he pointed out.

Clark's recipe for getting along today while there are no appliances to sell was a combination of hard-headed day-by-day realism and a confident weather-eye attitude toward the future.

The retailer's first answer, he feels, is in service and repair. With approximately 216 million appliances in use in the United States today (at least 30 million of them in the West) a certain percentage are going to break down and must be repaired. The dealer who fails to do this will not be remembered kindly in post-war days, Clark pointed out; but the dealer who gives just as much

serious thought and care to his service department as he formerly gave to his sales department has a chance of maintaining such a department on a profitable basis, and can build a great asset of customer acquaintance and good will for the future.

Another way for dealers to maintain a place in the appliance picture of tomorrow according to Clark, is to shoulder a part of the job of educating the public on how to make appliances last and how to use them for best results in health and nutrition.

"Fortunately you don't have to stand alone in this effort," Clark reminded the dealers. Utility companies and manufacturers are in the field with practical programs for service and repair, doing the promotion and advertising jobs, directing service customers to dealer stores. Most appliance manufacturers, with government approval, have built up large stocks of repair parts, estimated to care for demands for two years. Manufacturers have organized service schools and are furthering nutrition education. The dealer can identify himself with these industry-wide activities in a way that will produce surprising results for today and tomorrow, Clark believes.

Service's Guage of Worth Today

Northern California Electrical Bureau redesigned for war; launches training program for repairmen

IF IT IS to keep alive it must be of service. That in a sentence is a principle upon which cooperative and industry promotional organizations such as bureaus, leagues, societies, must gauge their worth at all times. When war requirements eliminate merchandise and wiring materials and frown on load increases, such an organization must change its objectives and find ways to serve the industry for which it exists.

With this realistically in mind the Northern California Electrical Bureau, which now embraces what used to be the Electric Appliance Society as well, has been redesigned for wartime service by its board of directors and officers. New officers have been selected, new committees created, new departments of activity designated, and the first fruits of that new program will soon begin to bear.

Attack will be made first upon what has developed to be a most pressing necessity—the furnishing of trained manpower to electric service dealers so that the appliances now stacking up for repair can be cared for and returned to useful service by consumers.

Drafts upon manpower both by the armed forces and war industries have drawn away from dealer shops so many of the experienced and trained appliance repair mechanics that Pacific Gas and Electric Co., in following up on its "Durationize" program found a majority of repair shops with from three to six months work piled up. Saturation of appliances has been so high in the region, and new appliances unavailable for replacements, that an ordinary toaster repair sometimes is promised within six weeks at the least. The prospect ahead is that such volume will be maintained all during the war.

The parts situation has not yet become critical, most manufacturers having been ordered by WPB to make a supply for about two years before ceasing manufacture. But the manpower shortage is real. It is upon this problem that the first activity of the Bureau will be concentrated.

The education section of the bureau, chairmanned by George C. Tenney, has launched the repair service training program with which to meet this need. Jared A. Hill, Pacific Gas and Electric, has completed arrangements with two trade schools for training courses and has prepared a curriculum after interviews with dealers and mechanics to make it practical and useful. The course is an 80-hour course, which will take a month to complete in full daytime classwork, or three months in night classes.

Samuel Gompers Trade School in San Francisco will begin its course Sept. 2. The Central Trade School in Oakland will start Sept. 14. Later as the plan develops similar courses may be started in Sacramento, Stockton, Fresno, San Jose and Santa Rosa. Recruits for the course are being sought among four groups: 1. men with slight physical handicaps not eligible for draft or war production, 2. men over draft age but who have slowed down and cannot keep the pace of war production, 3. women, and 4. those already employed but needing more training.

A survey will be made over the entire PG and E territory to determine exactly how many such trainees are actually needed, what the working conditions will be, the wage scale. This will determine the extent of the program. Meanwhile kindred problems will be looked into on behalf of the dealers—priorities on hand tools, new tools made available for light work, the making of parts for obsolete models, etc.

In the readjustment of the bureau to war needs new officers and committeemen were selected by the enlarged board of directors. Louis J. Breuner, Breuner Co., Oakland, was elected president. He was formerly president of the Electric Appliance Society. Vice-president is Charles W. Goodwin, Jr., General Electric Supply Corp. Secretary is O. R. Doerr, general sales manager, PG and E. Treasurer is Arthur E. Rowe, chairman of the Pacific Radio Institute.

A small executive committee was selected to expedite operating procedure for the board of directors. Besides the above officers, these are: B. W. Reynolds, PG and E, and chairman of the executive committee; George Abbett, electrical contractor; Ben Tassie, General Electric Co.; Al Meyer, Leo J. Meyberg Co.; George C. Tenney, ELECTRICAL WEST; Edward Duggan, Westinghouse Supply Co.; Charles Goodwin Jr., General Electric Supply Corp.; H. J. Newton, National Electric Products Co. Members of this committee heading section advisory committees are: Ben Tassie, appliance; H. J. Newton, wiring; Edward Duggan, lighting; and George Tenney, education.

The complete board of directors:

Manufacturer-Supplier Group

Fred S. Fenton, Easy Washer; Al Meyer, Leo J. Meyberg Co.; George Egleston, H. R. Basford Co.; R. G. Hutchinson, Frigidaire; Ben Tassie, G-E Co.; Philip Carson, Graybar; Edward Duggan, Westinghouse Supply; Ralph Peterson, Garnett-Young Co.; Charles Goodwin Jr., G-E Supply; Miles Steel, Benjamin Electric; Marvin Jankelson, Incandescent Supply; Allan Jones, G-E Co.; W. P. L'Hommedieu, Westinghouse Electric & Mfg.; F. C. Sharr, Bryant Electric; H. J. Newton, National Electric Products Corp.; Edward A. Casey, Anaconda; Walter Thompson, Westinghouse Lamp Co.

Retailer Group

Louis J. Breuner, Breuners; George D. Oliver, Jr., Turner Hardware; Lyman W. Ling, Jackson Furniture; S. W. Newman, Charles Brown & Son; Obert Pederson, Pederson Furniture; Newton Hale, Hale Bros.; H. D. Pischel, Dohrmann Commercial Co.; Lawrence Ellis, Weinstock Lubin; P. M. Diederich, L. Lyons & Sons; Clyde Chamblin, California Electric Construction Co.; Kenneth Ryals, Stone Ryals Electric Co.; George Abbett, San Francisco Electrical Contractors Assn.; Conn Franke, Stockton; Frank Boyd, Pacific Electric Motor Co., Oakland.

Members at Large

George C. Tenney, McGraw-Hill Co. of Calif.; Arthur E. Rowe, Pacific Radio Institute; LeRoy Smith, California Hardware Assn.; Ralph Wiley, Chief, Dept. of Electricity, San Francisco; Frank Runyan, Merchandise Mart; George Fitch, Retail Furniture Assn.

Utility Group

R. E. Fisher, vice-president in charge of public relations and sales, PG and E.; O. R. Doerr, general commercial manager; B. W. Reynolds, merchandise manager; H. H. Courtright, Valley Electrical Supply Co., Fresno.

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Electrical West

Business Guide

For Electrical Dealers and Salesmen

Help Hometown Conversion to War Production

It may seem a far step from your business as an electrical dealer to that of servicing a war industry. But farther steps than that are being taken these days to win the war. So if your store or business can do its bit toward this single objective upon which the efforts of **all** are now being concentrated, it may speed the day when you can return to normal life.

In every town and city there are small shops whose peacetime work was that of supplying service to a variety of civilian needs and equipment—garages, machine shops, tinsmiths, woodworking plants, packing plants, food preparation plants, boatbuilders, and the like. True, many have closed their doors, their owners and mechanics going to work in some larger war production center or plant.

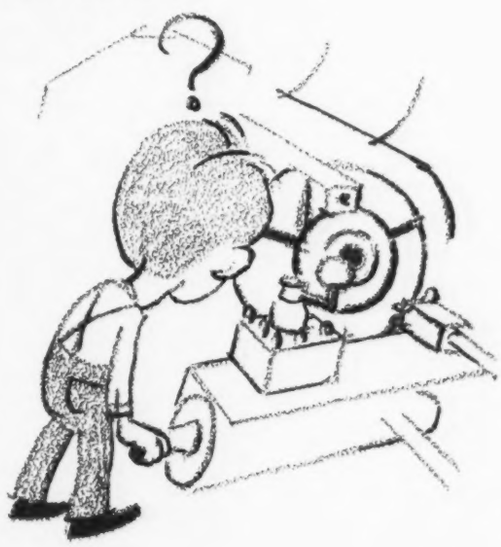
But others are finding that the lathe and machine tools they possess, while not massive or extensive, can take on the job of making many needed small parts; their shop equipment can be converted to make many of the thousands of items necessary to feed, clothe and equip the army, navy or merchant marine.

In such conversion from peace to war production, speed and accuracy are so important that the kind of lighting that was "good enough" to do an occasional small job will not do for sustained day-by-day production work.

There are two ways in which perhaps you can place your experience and training as a dealer and merchant at the useful disposal of such fellow townsmen as are doing or consider doing such converted war work. These ideas may never have occurred to you, yet may offer very valuable help, and make some business for you besides.

First, your buying and purchasing experience can be turned to good account by taking on the details and the procedure, the selecting, ordering and delivering of the materials needed for the job. **It is another kind of merchandising, of store keeping,** but its principles are the same.

Second, you can turn your knowledge of lighting the home to aid seeing for the war job, perhaps even converting domestic equipment in some cases.



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September, 1942

Soap and Water Go to Work

An idea or two for the dealer seeking other services to render as his merchandise stock drops

Transportation what it is—and is yet to become, the roving salesman for the manufacturer of commercial and industrial lighting equipment, or anything else for that matter, is not going to be able to service and sell all these small converted war industries. But if **you** are on the ground, and within walking distance, the full utilization of your abilities into the war program will eventually demand that such representation be asked of you. Why not **ask** the manufacturers for it yourself.

By making yourself "purchasing agent" for local industries, you serve the local shop, you serve the manufacturer whose distribution and sales problem is made difficult by the war, and by serving both to aid war production, you serve your nation. Of course at first there will be obstacles of habit to overcome—"it's never been done before this way," for instance. But the times require throwing that old idea into the discard.

In the formation of local pools to take on a contract and subdivide the various parts of it among local shops, the electric appliance merchant can be especially valuable to handle the purchasing, the accounting and record keeping, the negotiations and sales end of the project, even the delivery and receiving—the traffic control. It is obviously the desire of the War Production Board that the entire nation get into harness on the big job. Perhaps this is the way the electrical dealer can serve best, in conjunction with keeping appliances in repair for the duration.

There is another business opportunity for the electrical dealer with initiative. It is to develop a lighting maintenance service for these war production shops. Most of them will be so preoccupied with the details of tooling, supervision, inspection and production that they would welcome a regular service to install, maintain and service their lighting. It may have to be sold to them first, but a good salesman will enjoy doing that.

It isn't a new idea in big cities. There buildings and factories often hire building maintenance services to handle janitor work and cleaning, window cleaning service for win-

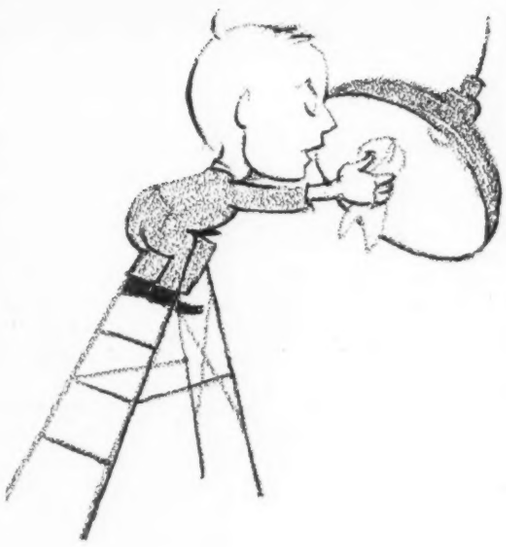
dows, typewriter and dictating machine monthly checkup and service, and other similar routine maintenance jobs for which they do not want to go to the expense of setting up themselves for only occasional use. Often they neglect such maintenance when it is left to someone in their own organization, someone too busy, who puts it off and never does get around to it. In ordinary times, when equipment ran down new could be purchased to displace it. But not these days.

To sell such an idea, bring out such a possibility, and show how a regular maintenance service would:

1. **Relieve them of this chore.**
2. **Do a more thorough job with a specially trained crew.**
3. **Keep irreplaceable equipment working.**
4. **Get all the light out of them, continuously, that the fixtures gave originally.**
5. **Do the job expeditiously, with the right equipment, keeping out of the way of the work.**
6. **Minimize breakage by knowing how to handle the equipment.**

Although item 1 above might prove the most appealing, the economy of giving you the job to do on a regular basis could best be proved by item 4.

When dirt accumulates on the reflecting surface of both lamps and reflectors, illumination may be reduced 30 to 50% from that produced when the installation was put in. Mere wiping with a cloth helps some but usually results in smearing the



dirt rather than real cleaning. But a good soap and water washing will restore reflector efficiency to very nearly the original. Tests made on an aluminum high bay reflector showed that dirt reduced its efficiency 42% and the candlepower was reduced 66% because the distribution was changed.

Lamp replacement, too, is necessary and often neglected until after the lamp has passed its useful light-giving life. With fluorescent lamps it is especially important that lamps near the end of their life be replaced, because defective flashing lamps will damage starters and ballasts.

Another advantage to local business of running such a service is that often it provides an opportunity to sell some of the equipment you may still have, or to adapt even some of the domestic or office lighting units in stock to help out some war production job.

Think it over.

PUGET SOUND POWER & LIGHT CO.
PORTLAND GENERAL ELECTRIC CO.
CALIFORNIA OREGON POWER CO.
UTAH POWER & LIGHT CO.
IDAHO POWER CO.
ROCKY MOUNTAIN ELECTRICAL LEAGUE

For Value Received— Customers Are Pleased

Ninth of a series of good sense articles on business management

By Ken Hampton

LETTING customers set your retail prices is an age-old way of going out of business. It has been practiced without success by would-be merchants for centuries. The merchant, like any other worker, is worthy of his hire. The bugaboo in his affairs is the element of cost of doing business (which we may discuss in a later article), complicated by the fact that he handles sums of money as a clearing house for others. In the processes of buying and selling, he handles twenty or more times as much money as he earns. He is custodian of this money and may easily divert it to meet his expenses, salary and even return on his capital unless he both understands his responsibility well and knows his cost of doing business intimately.

Assuming that the method of marking his merchandise for sale results in putting a fair resale price on it, there are many pitfalls of price cutting that must be avoided. In the sale of large units such as stoves, refrigerators, radios, washing machines, etc., there is a great temptation to make price concessions. This arises for the following reasons:

1. The customer is spending a relatively large amount of money (often more than one month's salary) and so acts with caution. The slowness on the part of the customer in making up his mind to buy often causes the salesperson to seek to hurry the decision by cutting prices. This, of course, is wrong because the small cut that can be made probably will not materially speed the decision, but once a concession is offered, it cannot be withdrawn.

2. The transaction often involves both a sale and a purchase due to the fact that the customer has an appliance fulfilling the same function that the new appliance is to replace. The customer wants to sell his present equipment as well as purchase the new apparatus.

Thus, the merchant is faced with both buying and selling. It is often best to have, if possible, a person trained in buying appraise the appliance to be traded in. This trade-in price should be set at a price that will enable the merchant to make his usual mark-up on the resale price. Under no circumstance should appraisal values be made excessive on the excuse that a large scale sale is involved. This is price cutting. It is often well to explain to the customer that you are both buying and selling on a fair basis when stating the price offered for the trade-in appliance.

3. Fear of competition often is the excuse used to justify price cutting. Competition must be met by internal efficiencies and superior salesmanship, not by price concessions, if one is to remain profitably in business. This, of course, assumes a fair pricing policy—any other policy results in bargaining, forcing prices to a fair level and is not price cutting.

Now, a few words about profit. Custom has established fair pricing policies for most businesses. These must of course relate directly to inventory turnover, any especially expensive local conditions (these can usually be charged for as special services, such as installment expenses, etc.), and credit losses as well as plant investment.

A merchant should follow these sound established prices. In striving to be efficient, he must beware of the dangerous idea that he is so much more efficient than others that he can consistently sell for less, unless he has good factual information, proving this condition. This is obvious when it is realized that a 5% net profit on sales is an unusually large profit. If the merchant gives one-half of this $5 profit per $100 of sales off as a discount or excessive trade-in, it will usually not tip the scale in his favor. Once such bargaining starts, all his sales arguments become secondary to price and the points of quality are evaluated in the light of the price concession made.

Perhaps the best all around advice on price cutting is DON'T. The best way to avoid it is to spend your time in making customers want your merchandise rather than having them try to buy it from you at a bargain.

Sell your product thoroughly as the best value to meet the customer's needs, at the price you have set, and you will stay in business and make a profit. Cut prices and you will operate unprofitably. This is business suicide. Through it everyone loses. The manufacturer loses his outlet, the dealer loses his livelihood, the community loses a store, the customer loses a place to buy merchandise, to get repair service and needed information.

Don't cut prices, but give fair value in the full knowledge that you as a merchant fulfill a necessary place of value in your community and so are worthy of your hire. Customers don't brag about buying from failures—they are pleased and proud to trade with substantial, reputable firms who profitably hold to a one-price policy.

How to Figure Profits—If Any

Experience has proved that but few business men have learned to figure profit properly. Remember that 20% added to cost does not yield 20% profit. Profit is properly figured on sales, and to make a 20% profit you must add 25% to cost. Keep the following schedule before you and you will find it worth many dollars in the course of a year.

5%	added	to	cost	is	4¾%	profit	on	selling	price.
8½%	"	"	"	"	7%	"	"	"	"
10%	"	"	"	"	9%	"	"	"	"
12½%	"	"	"	"	11⅛%	"	"	"	"
15%	"	"	"	"	13%	"	"	"	"
16%	"	"	"	"	14¼%	"	"	"	"
17½%	"	"	"	"	15%	"	"	"	"
20%	"	"	"	"	16 2/3%	"	"	"	"
25%	"	"	"	"	20%	"	"	"	"
30%	"	"	"	"	23%	"	"	"	"
33 1/3%	"	"	"	"	25%	"	"	"	"
35%	"	"	"	"	26%	"	"	"	"
37½%	"	"	"	"	27¼%	"	"	"	"
40%	"	"	"	"	28½%	"	"	"	"
45%	"	"	"	"	31%	"	"	"	"
50%	"	"	"	"	33 1/3%	"	"	"	"
55%	"	"	"	"	35½%	"	"	"	"
60%	"	"	"	"	37½%	"	"	"	"
65%	"	"	"	"	39½%	"	"	"	"
66 2/3%	"	"	"	"	40%	"	"	"	"
70%	"	"	"	"	41%	"	"	"	"
75%	"	"	"	"	42 2/3%	"	"	"	"
80%	"	"	"	"	44½%	"	"	"	"
85%	"	"	"	"	46%	"	"	"	"
90%	"	"	"	"	47½%	"	"	"	"
100%	"	"	"	"	50%	"	"	"	"

War Plant Line Record Is Tower Per Day

Thirty-seven towers erected in 36 days on 132-kv. Bureau of Power and Light line as result of coordination of engineering and construction—Crane erection technique and novel conductor stringing method are used

BY CLOSE COORDINATION of engineering, design and construction, engineers and field forces of the Los Angeles Bureau of Power & Light set a remarkable record of one tower per working day in erecting a new transmission line to furnish energy to the 170,000-kw. aluminum reduction plant being built in Los Angeles. Careful organization coupled with the crane erection technique developed on the Bureau's Boulder lines made this record possible, despite such wartime complications as priorities and preference ratings for materials.

Job Took 36 Days

The schedule for completing the 6.2-mile, 132-kv., double-circuit steel tower line ran as follows:

May 5: Project released to construction forces.

May 16: Construction started with drilling of first holes for tower footings.

June 9: Conductor stringing began.

June 20: Line energized ahead of schedule in 36 working days after breaking ground for first footings.

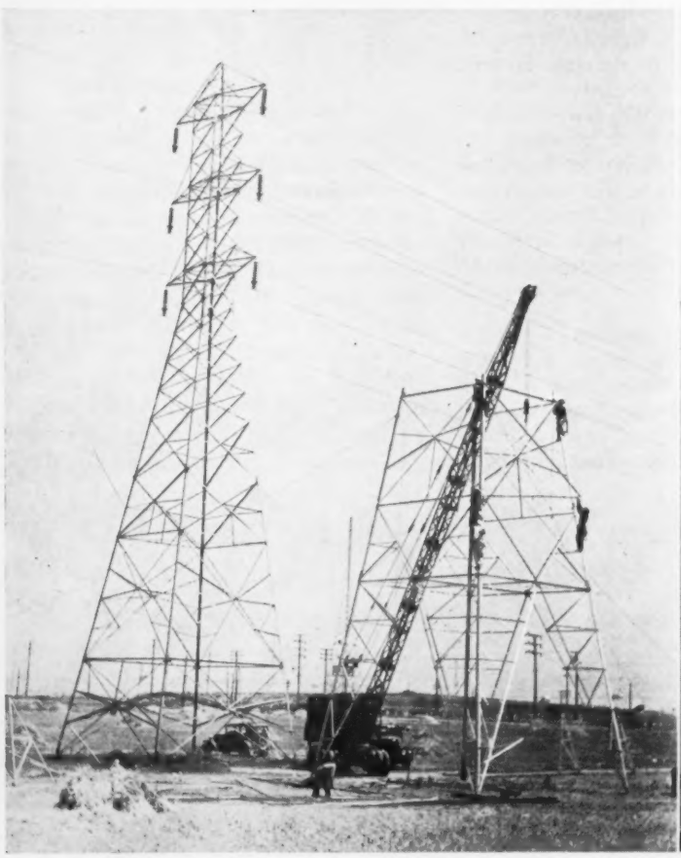
The story of how this was accomplished exemplifies the spirit and capabilities of the utility organizations in meeting the emergencies occasioned by the war. In this instance a vital war industry was assured a ready and ample supply of electric power through the energy and resourcefulness of the Bureau's engineering and construction forces.

Extending from Receiving Station "C" in the Wilmington area to the site of the Defense Plant Corporation's new aluminum reduction works, the line traverses a level area ideal for the construction technique employed. As soon as designs were completed and right-of-way and materials assured, construction planning was started to take advantage of every possible shortcut that would insure erection of the line within the time allotted. Construction crews were mobilized hastily around a nucleus of superintendents and foremen who were experienced in the technique used in the building of the Bureau's 287-kv. Boulder transmission lines.

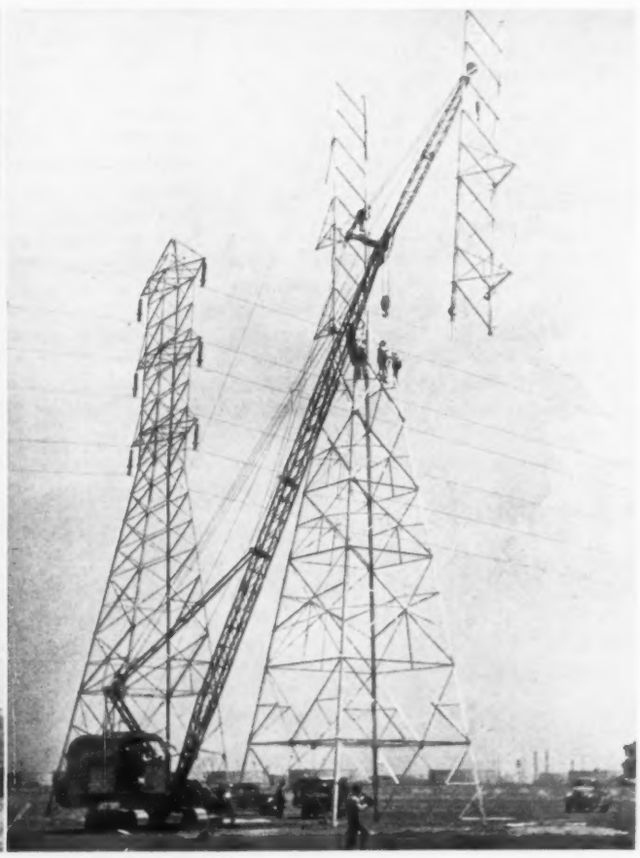
Steps Told

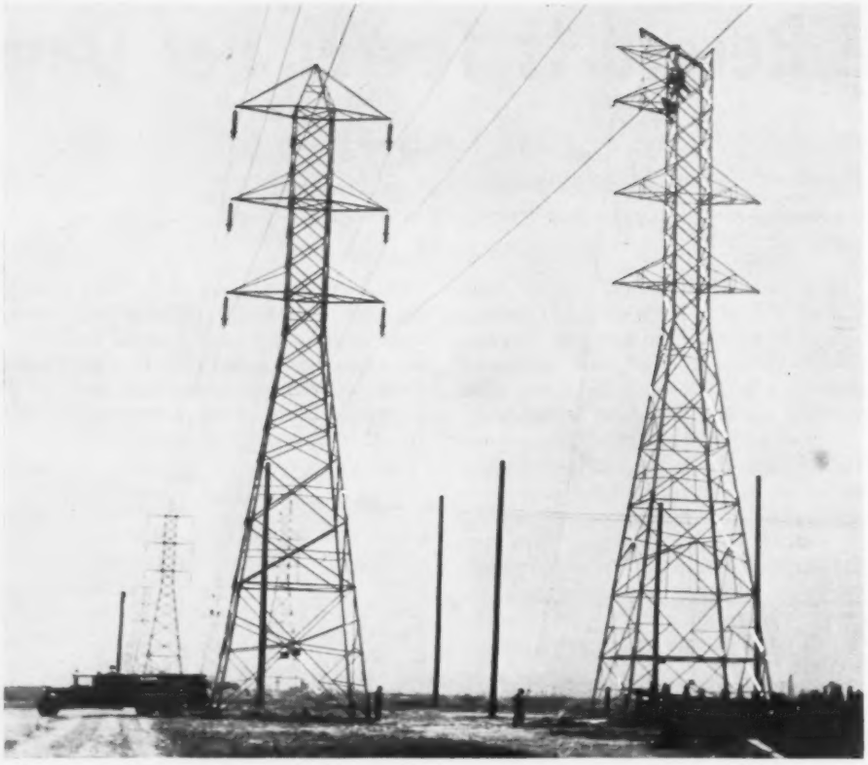
Initial step in the construction program was the drilling of 8 and 10-ft. deep holes for concrete tower footings using a truck-mounted earth-boring machine. Stub setting crews then placed the reinforcing cages which were electrically welded to the tower stubs. On a 90-deg. angle tower the cage and stub were placed in an 11 ft. 6 in. deep hole 9 ft. in diameter, undercut at the bottom. A concrete crew then poured the footings. After a 2-ft. 3-in. concrete pad was placed in the bottom of the

Initial step in erection of 132-kv. steel towers is setting pre-assembled sections with 13 men and truck-mounted crane



Second step was raising crossarm and cage assembly with crawler crane and a 105-ft. boom. Two lifts did the job





Third step in tower erection was performed by a 5-man crew using a small gin-pole for setting top conductor crossarms and two ground wire arms. Final step was tightening and center punching all bolts and nuts. Six men did this job

hole, more concrete was poured up and around the reinforcing steel until a pedestal 1 ft. 10 in. in diameter extended 6 in. above the ground. The reinforcing was covered to a depth of 2 in. on all sides. Other towers had similar but correspondingly smaller footings. For suspension towers an average of 5 cu. yd. of concrete was poured from truck-mounted mixers which chuted the concrete directly into the footing forms. Both wood and steel forms were used, the former as a measure of the conservation of critical materials.

Erection Technique

Erection technique depended upon the type of tower. Some of the specifications follow: Average weight, supension towers—18,000 lb. Maximum weight, dead-end towers—39,000 lb. Average span, 735 ft. Minimum height to bottom crossarm on suspension tower, 70 ft.; maximum height, 90 ft. Conductor configuration and spacing—vertical. 15 ft.; horizontal, 24 ft. Ground wire spacing same as conductor spacing. Ground wires 10 ft. above conductors.

For the eight dead-end towers a floating gin-pole method of erection was used. A telescopic latticed steel floating gin-pole was employed. For the suspension structures three different crews each equipped with special machinery did the work. The towers were fabricated in a southern California mill and were delivered to the site in complete units. After delivery they were laid out and bolted up on the ground in units suitable for the erection equipment to be employed. Cages and cross arms were assembled in two halves, split vertically. One half of the cage and one half of each of the bottom and middle cross arms were bolted together as a unit, having a weight of approximately 2,000 lb.

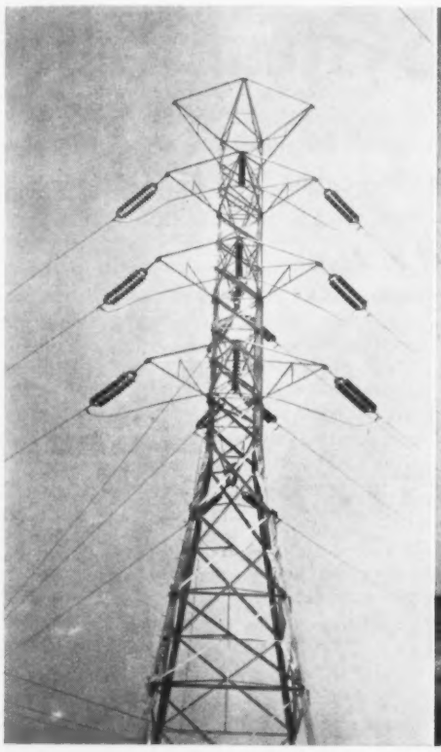
Four Crews Employed

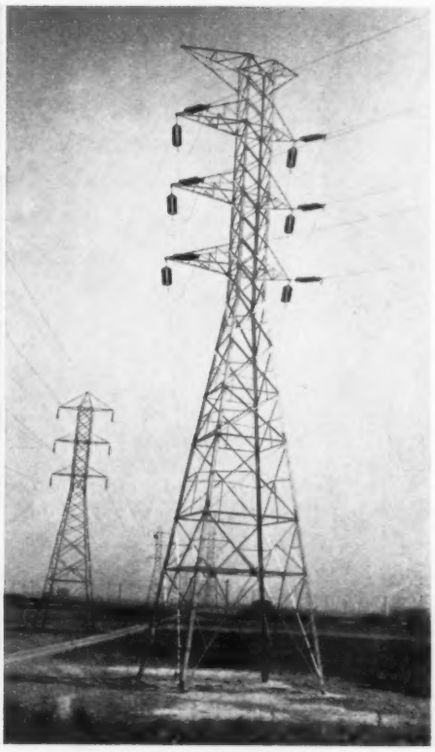
Initial erection step was performed by a 13-man crew with a 75-ft. boom truck-mounted crane. This crew placed the tapered portion of the towers. It was followed by a second 13-man crew with a crawler crane having a 105-ft. boom. With two lifts, this crew erected the cross arm and cage assembly. This latter crane was the same used in the construction of the Bureau's Boulder lines, a pioneering application of this technique. The third crew consisted of five men who erected the two crossarms and the two ground wire arms, using a small wooden gin-pole. A fourth and final crew, comprised of six men, tightened and center punched all bolts and nuts and made the final inspection.

Using the method described above, flat country suspension towers were erected at a cost of 50% less than that for the customary gin-pole method of erection.

The same careful advance planning which was applied to the tower erection was followed in programming conductor stringing operations. Because of WPB restrictions, it was impossible to use the 500,000 circ. mil hard drawn concentric copper for which the double-circuit line was initially designed. Instead two 300,000 circ. mil copper conductors available in the Bureau's stocks were strung. However, hardware was used which will permit the later stringing of a second and parallel 300,000 circ. mil conductor if future requirements of the aluminum plant should require doubling of the present capacity. Insulator assemblies consisted of

In conductor string operations a tension control machine paid out cable from a reel truck carrying three reels of wire A stringing unit consisted of two reel trucks, two "bull wheels" and a truck-mounted hoist for holding splicing tension





On a 90-deg. deadend (above left) the outside jumper loops were stiffened with a 20-ft. length of copper tubing supported in the middle by one suspension assembly. The 30-deg. angle deadend (right) shows insulator hardware assembly

twelve 10-in. 15,000-lb. porcelain ball and socket type units for the suspension strings and two strings of 13 similar units for the dead-ends.

Standard practice of the Bureau in stringing all large sized conductors is to use tension wheels because of the perfect control to be had over the conductor at all times. Experience gained on the 287-kv. Boulder lines with this technique has resulted in the perfection of a speedy and well controlled method. On the aluminum plant line, two tension wheels were set ahead of the three 4,000-ft. reels of conductor mounted on trucks. One tension wheel handled each circuit as the conductors were payed out. Each of the conductor reels on the reel truck was equipped with a lever mechanism for side braking.

"Bull" lines for pulling the conductor were carried on tractor-mounted winches, each of which held 6,000 ft. of ½-in. steel wire rope. As it was pulled out, each conductor ran over 8½-in. diameter roller bearing steel sheaves hung from the tower cross arms. These held the conductor at an elevation corresponding to its final position in the suspension clamp. Next step was to transfer the conductor to double-drum, truck-mounted hoists for pulling up and sagging. This operation was performed for eight to fourteen spans at a time, depending upon the position of dead-end towers, using levels clamped to about every fourth tower leg. A field telephone system was employed both for pulling in and sagging the conductor.

Time was saved by making all splices on the ground. In the case of dead-end towers the conductors were pulled through and around, and jumper loops measured and marked for location of the dead-end clamps. This eliminated the need for making high-compression copper-sleeve splices in the jumper loops.

For dead-end towers with line angles of 50 deg. and over, the suspension insulator assembly is in the outside jumper loop. Where line angles exceed 86 deg. the conductor in the outside jumper loop was stiffened by encasing it in a 20-ft. length of ¾-in. EHIPS copper tubing.

Progress on each of the various steps in the construction of the line set new high records. Tower footings were poured at a rate of four towers per day. Steel for the suspension towers was erected at a speed of five towers per day. Wire was strung on the straight sections at a rate of eight reels per day. Finally the entire line consisting of 37 suspension towers and eight dead-end structures was completed in 36 working days.

All of this was accomplished with a fine accident record despite the speed of construction and the fact that many of the workers were unfamiliar with this type of construction. Only two lost-time accidents occurred with 14 days lost out of a total of 50,000 man-hours worked.

The Bureau's operations are directed by H. C. Gardett, chief electrical engineer and general manager and the aluminum plant line was designed and constructed under the supervision of R. R. Robertson, engineer of design and construction, with M. O. Bolser, engineer of design, C. P. Garman, assistant engineer of design and the following in charge of construction: Grant E. Benkesser, engineer of construction; James F. Moran, general superintendent of construction, and Charles W. Ragan, construction superintendent.

Power Factor Correction

How to determine kva capacity required to correct given load†

The kva. capacity required to correct any given load to any desired power factor may be determined by knowing present load and present power factor and power factor desired.

Formula

$$\text{*Present kva.} = \frac{\text{present load}}{\text{present p. f.}}$$

$$\text{Present rkva.} = \sqrt{\text{present kva.}^2 - \text{present load}^2}$$

$$\text{Kva. at desired p.f.} = \frac{\text{present load}}{\text{desired p. f.}}$$

$$\text{Rkva. at desired p. f.} = \sqrt{\text{kva. at desired p. f.}^2 - \text{present load}^2}$$

$$\text{Corrective kva. capacity required} = \text{present rkva.} - \text{rkva. at desired p. f.}$$

$$\text{*Kva. of a 3-phase circuit} = \frac{\text{amps. per phase} \times \text{volts} \times 1.732}{1000}$$

Example

Given—present load 1000 kw. at 55% pf. Desired pf. 90%

$$\text{Present kva.} = \frac{1000}{.55} = 1818 \text{ kva.}$$

$$\text{Present rkva.} = \sqrt{1818^2 - 1000^2} = 1518 \text{ rkva.}$$

$$\text{Kva. at desired pf.} = \frac{1000}{.90} = 1111 \text{ kva.}$$

$$\text{Rkva. at 90\%} = \sqrt{1111^2 - 1000^2} = 484 \text{ rkva.}$$

Corrective kva. capacity required = 1518—484 = 1034 kva. capacity.*

Capacitors are generally rated for use on 60-cycle circuits. If they are to be used on 50-cycle circuits it will require 20% more added capacity.

*If Capacitors are used for correction: Total capacity required @ 50-cycle = $\frac{60}{50}$ × capacitors required (with 60-cycle rating)

† Answer to one of the questions submitted to the technical question box, conducted by the Electrical Maintenance Engineers' Association of Southern California.

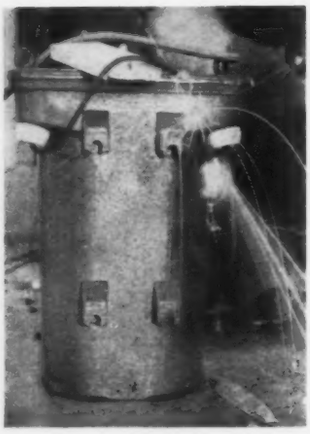


Fig. 1—Open-type fuse test

Capacitors Bring System Relief

Northwestern Electric adds 10,500 kva. of capacitors to distribution system and releases 8,500 kw. generating capacity; cost $7.25 per kva.

By Corbett McLean

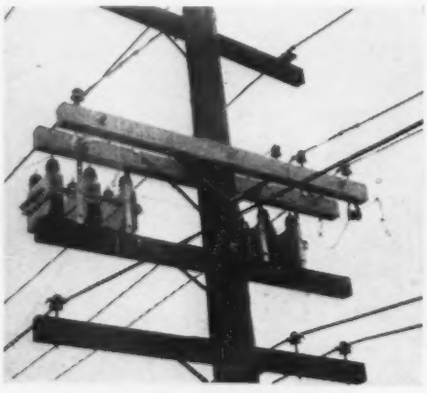
Assistant Engineer, Northwestern Electric Co.

FOR SEVERAL YEARS installation of shunt capacitors on distribution feeders had been considered by Northwestern Electric Co. It was not until late in 1941 that steps were taken to procure 10,500 kva. of 2,400-volt capacitors in 15-kva. units. This action was necessitated primarily to supply reactive power needed for load requirements and to release required kilowatt generating capacity. These units would also aid in raising the level of voltage on important 11-kv. busses which feed the 11/2.4-kv. distribution substations, in relieving overloaded substations and distribution equipment.

In June 1941, it was calculated that the maximum reactive power available with all rotating equipment at full capacity would be 91,330 kvar. when delivering the peak kilowatts estimated for 1942. The reactive requirement at this time would be 85,230 kvar. which would leave an excess of only 6,100 kvar.

The outage of even a small synchonous unit or the interchange of energy with other companies which would entail comparatively large transmission reactive power loss could easily cause a deficiency of kvars. resulting in rejection of load, dropping of system voltage, or both. Neglecting the beneficial elimination of losses, the installation of 10,000 kvar. of synchronous or static condensers would release 6,500 kw. of generating capacity. A preliminary study of feeder load and power factor charts indicated that 10,000 kvar. would compensate for the average 24-hour reactive requirements of Northwestern Electric 2,400-volt overhead feeders in the City of Portland.

Fig. 5—A 90-kva bank ready for test



The saving in actual system power loss by such an installation was computed to be 4,600,000 kwh. per year. At 3 mills per kwh., which might be an average cost of generation based on the use of both hog fuel and oil, the saving would then amount to $13,800 per year. In the fall of 1941, the reactive requirements had exceeded all expectations and on Dec. 1, 1941 had reached 84,700 kvar., practically the anticipated 1942 peak.

Due to the large proportion of motor load in defense plants under construction and contemplation, the additional load was expected to have a lower power factor than the average at that time. Interconnected companies were approached but they had no surplus reactive available. Since synchronous equipment could not be secured, and since static condensers had the additional advantage of releasing substation and feeder capacity as well as further reducing system losses, an order for 700 15-kva. units was placed.

In December 1941 and January 1942, extensive charts were taken on all 2,400-volt feeders to assist in placing the capacitor banks to best advantage. The average 24-hour kvar. requirement was computed and used as the basic amount to be installed per feeder. In several instances, good judgment dictated that deviations be made from the basic computations. It was believed better to over-compensate for average requirements at substations remote from normal reactive supply and to under-correct those adjacent to generator busses to reduce losses occasioned by transmission of reactive power. Overcompensation was deliberately provided for an important substation with inherently low voltage. An overhead 2,400-volt distribution map was then spotted with connected transformer capacities in small groups and the individual 3-phase load

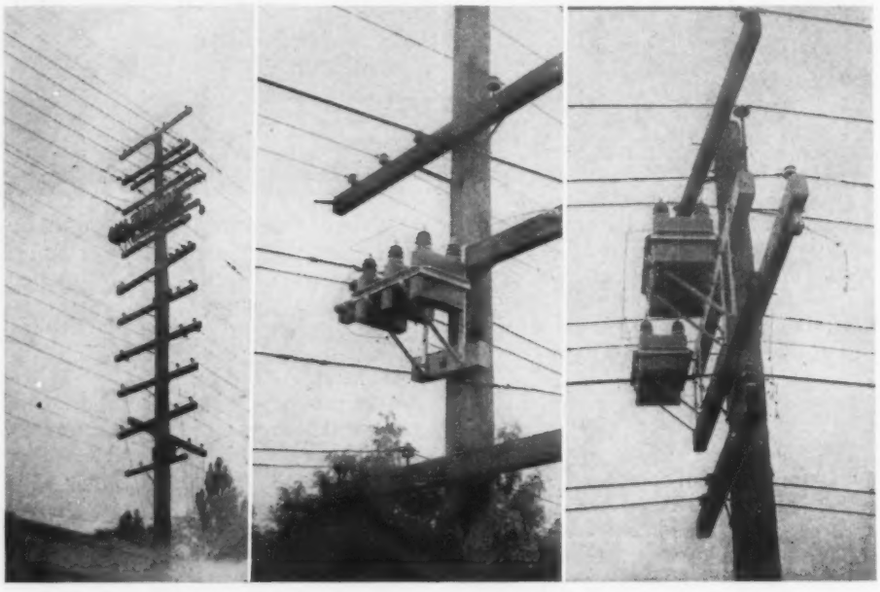


Fig. 2 (left) Typical crowded joint pole showing installation. Fig. 3 (center) and 4 (right) show how extra crossarm position was saved by hanging on primary arm

centers determined. This resolved the installations mostly into banks of 45 and 90 kva. although a few banks of 180 kva. were installed near concentrated load centers. The installation in 3-phase units of small size had the advantage of permitting phase balancing and line switching without transfer of connections or disturbance to their relative corrective effect.

Much discussion centered upon the advisability of fusing the banks. One argument advanced was that since the outages would probably be less than 0.3%, or two 15-kva. units per year, fuses could be dispensed with at a considerable saving in cost. The feeder circuit breakers would then be depended upon to clear the fault. Finally, tests were conducted on open-type fuses intended to be installed in the "grasshopper" type of holder. The operation was extremely satisfactory in clearing the arc without benefit of the spring tension in bottom and top holders. Fig. 1 shows test of this type fuse. The cost of this type of fusing is about 30 cents per phase for 45 and 90-kva. banks which use 20 and 40-amp. fuses respectively. Standard porcelain box dropout indicating cutouts were used for the 180-kva banks.

All the circuits for two power companies as well as telephone and telegraph circuits installed on joint poles

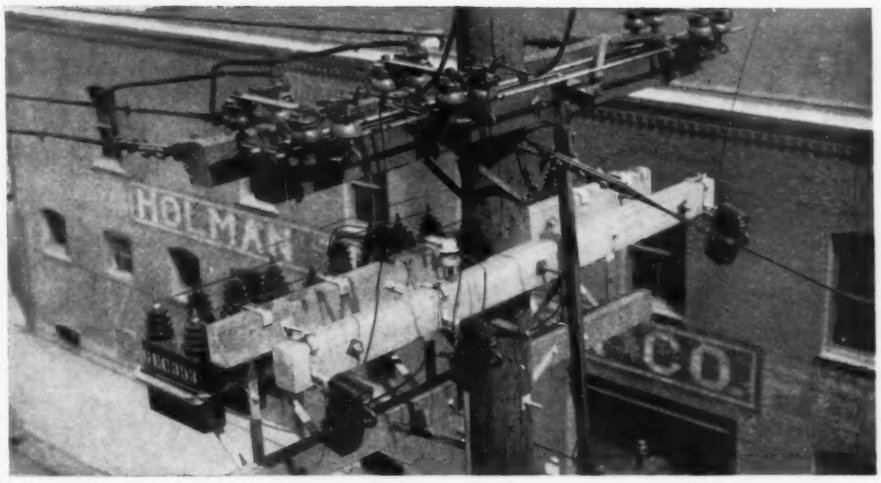
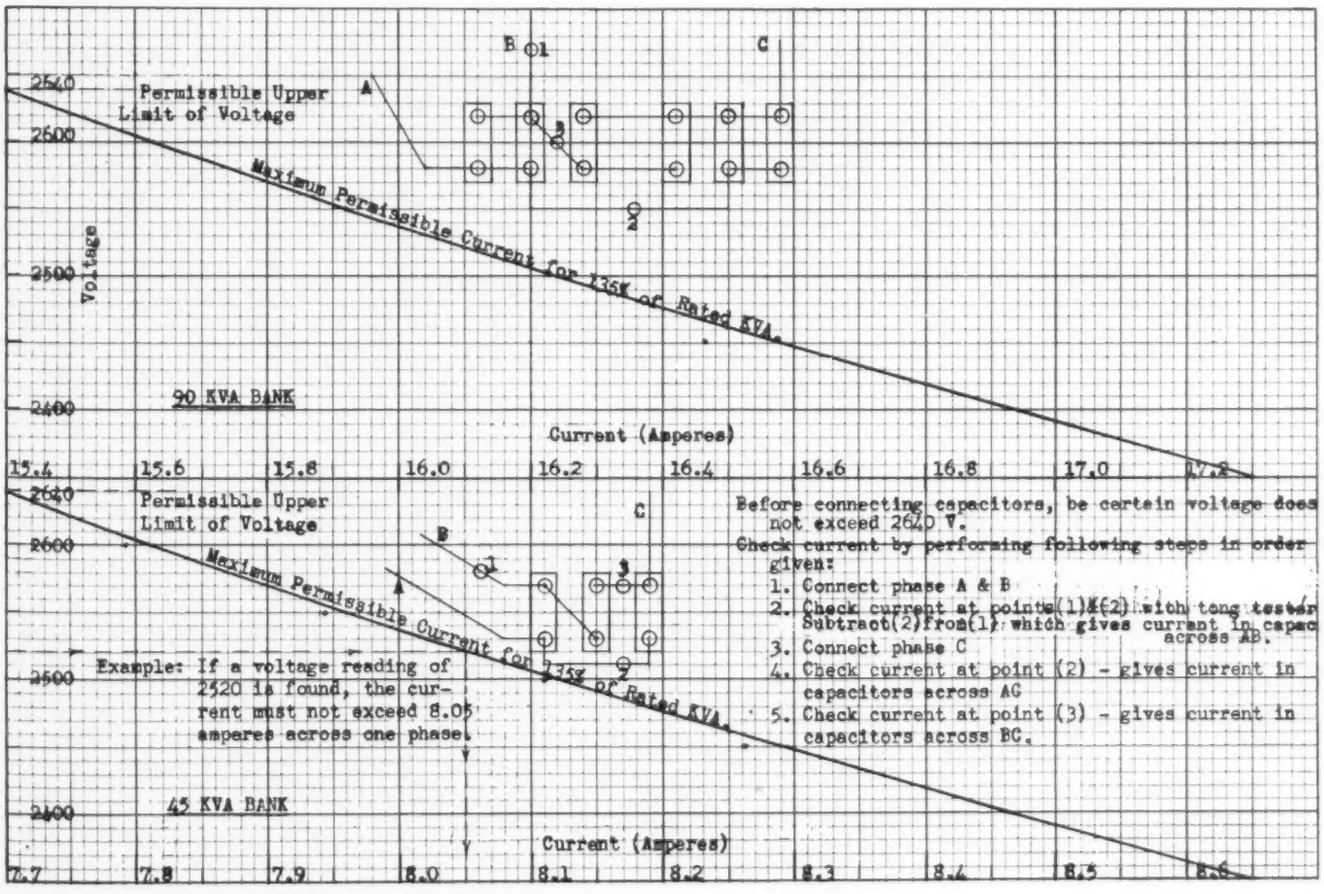


Fig. 6—A 180-kva. bank showing cutouts

in the City of Portland demanded that space for capacitors be reduced to a minimum. Fig. 2 illustrates such a situation with the attendant problem of space conservation. To save an extra cross arm position on the pole and to maintain proper clearances, the capacitors were lowered on the supporting bracket which in turn was hung on the primary arm. This can be seen in Figs. 3 and 4. Fig. 3 is of a typical 45-kva. bank and shows the hanger on the old primary arm. A short "kicker" arm, which would have to be replaced when bank capacity is increased, is used. Figs. 4 and 5 show a 90-kva. bank which has been installed by the line department but has not been tested and connected by the meter department. Double-arming and standard length "kicker" arm are required for this and larger sizes. The fuse, "hairpin" connector, and "skinned" primary can readily be seen. Fig. 6 illustrates a 180-kva. bank

Fig. 7—Curve of allowable phase current for 45 and 90-kva capacitor banks


Permissible Upper Limit of Voltage
Maximum Permissible Current for 135% of Rated KVA.
Voltage
90 KVA BANK
Current (Amperes)
Permissible Upper Limit of Voltage
Maximum Permissible Current for 135% of Rated KVA.
Example: If a voltage reading of 2520 is found, the current must not exceed 8.05 amperes across one phase.
45 KVA BANK
Current (Amperes)
Before connecting capacitors, be certain voltage does not exceed 2640 V.
Check current by performing following steps in order given:
1. Connect phase A & B
2. Check current at points (1) & (2) with tong tester Subtract (2) from (1) which gives current in capac across AB.
3. Connect phase C
4. Check current at point (2) - gives current in capacitors across AC
5. Check current at point (3) - gives current in capacitors across BC.

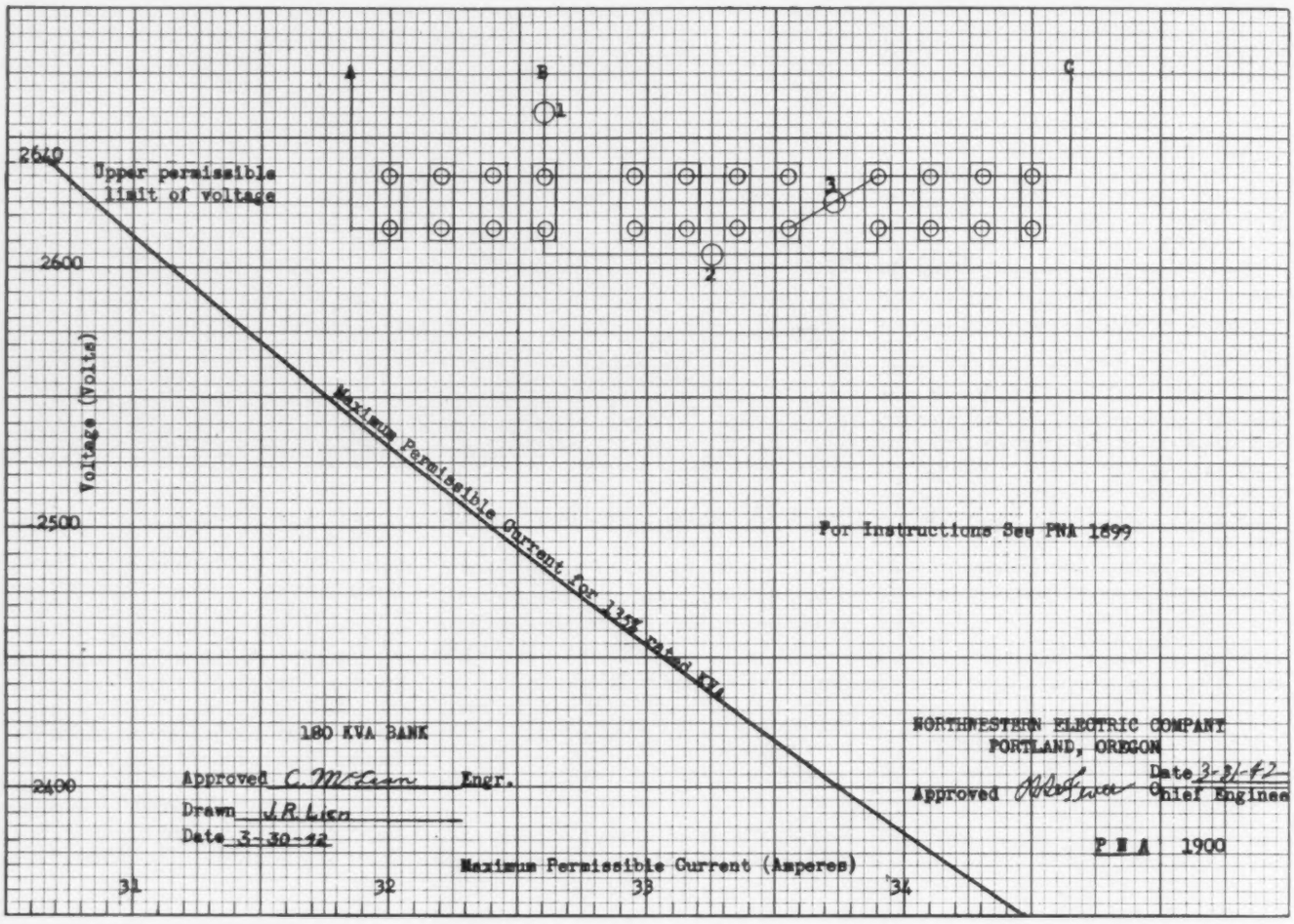


Fig. 8—Connections and permissible phase current for a 180-kva. installation

with indicating-type cut-outs installed. All units and hangers were bonded, and grounded either to secondary neutral, ground rod or both.

Instructions on installing, testing, and operating the capacitors were issued and distributed to various departments concerned. The necessity of continuous short circuiting of condensers and grounding them, as well as hangers, when disconnecting from the line was stressed. It was also pointed out that a distribution line with capacitors installed was still hot when the line switches were opened and that all three phases had to be short circuited and grounded to effectively "kill" the line. To facilitate the work of the meter department, curves of allowable phase current were issued as shown on Figs. 7 and 8. A mimeographed log sheet was also supplied for convenience.

The meter department first checked the voltages between phases. If these did not exceed 2,640 volts, the fuses were clipped on the line or cut-outs were closed, and the current was measured with a split core ammeter. If the kva. did not exceed 135% of bank rating, the installation was complete.

To date, all of the capacitors have been installed and over 9,500 kva. have been connected. Tests on feeders with installations completed show a very marked reduction of peak load current. An industrial feeder from Overton Substation had the current reduced by 32% with an increase of power factor from 66 to 96%. An industrial feeder from Stark Substation had the current reduced 15% and a residential feeder was relieved of 13% of its peak load. With the advent of summer and the seasonal decline of system loads, there is now some feed-back of reactive power at light load periods. This is beneficial as substation reactive losses are partially supplied from adjacent capacitors rather than from generators or condensers some distance away with resultant high transmission and transformation losses.

No excessive current which would indicate harmonics, resonant circuit, or defective capacitors has been found. One capacitor producing too low an output was found to be rated at 4,100 volts instead of 2,400 volts and is being replaced.

It is yet too early to determine the relief afforded to rotating machines by this reduction in reactive power. Since all of the feeders are regulated with the voltage generally exceeding 2,400 volts, and since the kva. capacity varies as the square of the applied voltage, the corrective effect may amount to 11,300 kvar. A rough estimate might place the relief of rotating machines at 15,000 kvar. when losses are considered. This amount would release approximately 8,500 kw. of generating capacity based on kva. rating. With reduced field current, resulting in lower generator losses and heating, this additional kilowatt output could be safely exceeded. The actual benefits to generation will be more readily seen during the 1942 winter peak.

Due to methods employed in use of economical indicating fuses, in lowering of capacitors on hangers to conserve pole space and crossarms, etc., the costs of installation are less than originally estimated and will be in the order of $7.25 per kva. including overhead.

Underground 2,400-volt and 11,000-volt feeders, overhead 11,000-volt feeders, and rural distribution lines will be studied for future application of capacitors. The problems of generation, transmission, and distribution are as vital for reactive power as for real power. This fact is thrust upon us as system capacities are approached.

Designed to Conserve

Simplified substation layout utilizes wood structures

By C. E. Baugh
Assistant engineer, Pacific Gas and Electric Co.

WAR conditions have necessitated a revision of outdoor substation designs to conserve vital materials and speed construction. The shortage of steel dictates the use of wood for station structures and the shortage of copper necessitates a simplification of station wiring diagrams to eliminate disconnecting switches, oil circuit breakers, and buses, insofar as is consistent with the furnishing of an adequate service for the duration of the emergency. It is apparent that the service that might be considered adequate under these conditions might be somewhat poorer than service that has been rendered in the past but this must be accepted as a necessary wartime sacrifice.

In line with this policy, Pacific Gas and Electric is building substations up to 10,000-kva. capacity with primary voltages to 60,000 volts and secondary voltages to 12,000 volts with minimum quantities of vital materials. A typical station to transform from 60,000 volts to 4,000 volts will consist of:

1. A 60-kv. switch and fuse mounted on a structure consisting of two wood poles with wood crossarms.

2. A transformer structure consisting of two or three wood poles for deadends and buses.

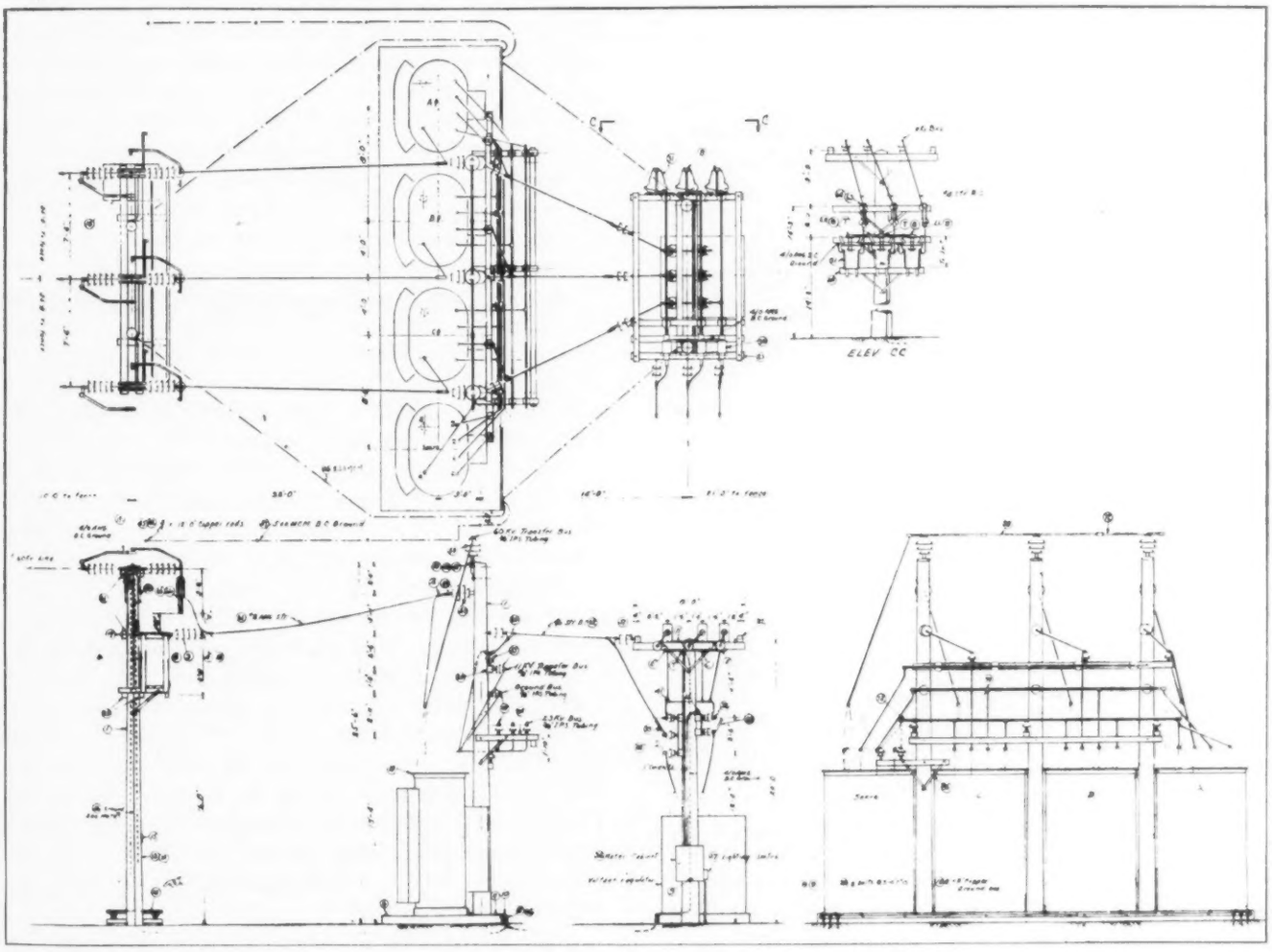
3. Low voltage bus structure consisting of wood poles and standard crossarms with a single bus.

4. Bus regulation, if regulation is required, the regulator step-type mounted in the low voltage bus structure and connected in the same manner as the feeder breakers.

No attempt is being made to build structures of wood that will have a life comparable to steel structures and it is to be noted that wood members such as poles and crossarms that are readily available comprise the principal materials. Fundamentally designs are based on the premise that many of the stations now being built will be dismantled shortly after the end of the emergency.

Efforts at conservation extend even to use of wood fence in place of steel wire in Pacific Gas and Electric Co.'s wartime program for outdoor substation structure

Simplified wartime layout of a 60/4-kv. substation developed by PG and E for maximum saving of critical materials



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Dark Shadow

IN frontier towns of this West of ours the memory of old timers still recalls the time when every man toted a gun to provide his own protection for his rights and belongings. But law had to come to displace gunpowder as a means of adjudicating clashes among contesting interests. That frontier world was "romantic" to look back upon, but uncomfortable and uneasy to live in, and hence could not be tolerated. We would not revert to it again willingly, for all its romance.

This war is such a regression. It is a throwback to an earlier, a more infantile period in human affairs when might was used to carve, or to supplant and preempt, right. For that reason we cannot live in a world bristling with guns and soaked in blood. This forest fire must be fought by backfire, it is true, but our ultimate goal is the restoration of a world in which it is safe to live at peace.

Our aim, as a nation, is to bring back to peoples of the world those decencies without which life is not worth living. On a more material level we seek to return a world in which those who want to work for them can have all the light, all the electricity—all the comfort and convenience and pleasure—they want.

We have no liking for this dark, inhibited, brutal world our enemies have plunged us back and down into. Like a shadow of evil, war has brought to our shores darkness where we once revelled in light, rationing where we were abundant and fruitful, restrictions and inhibitions where we have always been free to speak, write, think as we will, come and go at pleasure, observe and gather all knowledge freely.

Great is our wrath at this perversion of Nature's gifts, this debauch of civilization, this waste of manhood. So great is our wrath that we are determined to out-build, out-train, out-fight, out-war these who have cast their shadow over the world.

No Walkout on Safety

"WONDER why it is that when the safety part of the program rolls around, most of the audience gets up and walks out?" So mused the safety engineer of a large Western power company at a recent association meeting when the time came to discuss accident prevention. Perhaps the walkout was a tribute to the splendid accomplishments of the utility safety engineers rather than an acknowledgment of indifference or lack of appreciation, as he logically suspected. Whatever the reason, the time has come for a re-examination of the purposes of safety work and a general re-inculcation of the tenets of safety throughout all utility organizations.

This observation is based on the appalling increase in frequency and severity of utility accidents during the first six months of 1942 as revealed by preliminary figures. This trend was indicated by the 1941 accident compilations which showed a 7% increase in accident frequency as compared with 1940. Reasons for the upward trend are obvious—a large influx of new workers to replace those taken into the armed forces; relaxation of ordinary precautions brought about by emergency operations; inability to secure critical materials, resulting in departure from customary high standards; and finally the need to obtain the last possible bit of use from all safety equipment, especially that made of rubber.

Irrespective of the causes, the important thing is to reverse the trend quickly and immediately. Executive interest is essential. So is the wholehearted cooperation of every department-head in the individual utilities.

Statistical reports of the National Safety Council show where to concentrate in reducing hazards. For instance a study of the causes of 154 recent accidents showed that half of them were caused by lack of safeguards, particularly the use of rubber gloves, line hose and rubber blankets. Unsafe methods, such as working on lines or equipment that should have been de-energized was the second most frequent cause. Other contributory conditions were defective equipment and unsafe design, layout or materials.

Electrical utilities have made outstanding rec-

ords in accident prevention and safety work. It would be unfortunate to have past accomplishments nullified by emergency conditions brought on by the war. Furthermore, it is a truism that a life saved on the production front is equally as important as a life saved on the fighting front.

Job for Small Contractors

AS WAR demands bring the freezing of more and more consumer goods, the plight of the small electrical contractor becomes more desperate. His fate may well be that of his English counterpart who has been liquidated for the duration. In England the small contractor has given up and gone to work in factories with the tools, or in a few instances groups of contractors have organized to consolidate their businesses. In such a case one man operates the business of half a dozen and the latter go into the armed services or into war industries.

Here on the West Coast there is an outstanding opportunity for some enterprising small contractors. They can organize their businesses to service the millions of appliances in the homes of customers. Some are doing this. But there are instances where others can organize to take over the service work for department, furniture, home furnishings and other types of retailers who have neither the inclination nor experience to carry on this activity. The problem of keeping countless appliances, now irreplaceable, in service is a difficult one. However, it is an obligation of the industry, and one which the small contractor might well assume.

Non-Essential Paper Work

IF THERE is a paper shortage brought on by the war, it will not be due to the inability of manufacturers to produce. Principal contributory cause will be the zeal of government agencies for all kinds of reports. For instance, an electrical contractor brought in a new OPA form the other day. It must be filled out in triplicate and filed every time he sells a piece of secondhand electrical equipment. But his case is at the lower end of the scale. A Western electrical wholesaler has been forced to add three new employees just to fill out government reports. Manufacturers must file reports by the score to comply with requirements of the WPB and the OPA. Power companies top the list. The total number of government reports and filings—huge even before the war—now challenges the imagination—over 2,300 in the case of one large company. The list includes everything from forms which are filled out several times each day, to complicated reports required only annually.

The waste of valuable time, effort, money, paper and even space occasioned by these requirements would man and outfit an Army division. And little relief is in sight. As one agency simplifies its requirements, a new one springs up with demands that exceed the former one's simplifications. Someone has remarked that "if America loses the war, it will do it in triplicate." Heaven forbid any such eventuality, but the fact remains that unessential paper work is seriously detracting from the overall war effort.

Scrap for the Scrap

PERHAPS no business is harder hit by the shortage of critical materials than is the electrical industry. Its veins and arteries are copper or aluminum and these two metals are more precious in the war production effort today than is gold. But copper and aluminum are not the only rare metals. Shortages of all kinds of scrap have intensified the supply situation for many essential raw materials. For months now, utilities and others have been salvaging all kinds of critical metals. But the shortage now is so great that efforts can be redoubled by every organization in the industry—contractors, wholesalers, manufacturers and utilities. There should be no more junk piles, no more metal pieces put away with the observation, "we may be able to use it sometime." All of that can be used today in the war production program. It's time now to get all possible scrap into the scrap.

IN THESE days, life for every American is undergoing a big change and everything we hold sacred has come under a great challenge—direct, forceful, unavoidable. All of us now realize that our first responsibility is in giving our best to the winning of the war. Our lives, our homes, our children, the future of civilization depend upon it. The preservation of American institutions and complete victory over those who would destroy them are the primary elements of the great American creed. In the larger sense we are no longer in the lumber business, the shipbuilding business, the transportation business, the aircraft business, the farming business, the power business and so on. No longer are we, in the broader aspects, in the wholesale or retail business. When the great vision is understood, no longer are we as individuals, classified into employers and employees. We are in the war up to our necks, and we are in the Victory Business.—Frank McLaughlin, president, Puget Sound Power & Light Company.

Group Meetings Keyed to War

Northwest Electric Light & Power Assn. meets at Seattle to decide 1942 program, elect officers

On the basis of reports heard at its 35th annual meeting in Seattle, July 31, the Northwest Electric Light & Power Assn. will streamline activities for the coming year, continue cooperation with governmental agencies and wartime committees, and generally frame its program around the new industry problems created by the war emergency. President S. P. MacFadden, Puget Sound Power & Light Co., presided.

Subjects suggested for consideration during the coming year included: Personnel training problems; conservation of materials and manpower; salvage and reclamation of equipment and materials; scrap and junk collection and delivery; appliance servicing to maintain domestic revenue; dealer relations; commercial and industrial utilization to conserve capacity and energy; dimout and blackout procedure; electricity on farm to increase food production and save labor; utility advertising in wartime; customer relations with respect to possible power rationing; industry morale; and post-war planning.

George T. Bragg, vice-president and general manager, Pacific Power & Light Co., Portland, was elected president for the ensuing year succeeding MacFadden. W. A. Huckins, Utah Power & Light Co., Salt Lake City, was named vice-president.

Other officers were elected as follows: vice-president for Idaho, Ralph E. Gale, Idaho Power Co.; vice-president for Montana, M. E. Buck, The Montana Power Co.; vice-president for Oregon, James H. Polhemus, Portland General Electric Co.; vice-president for Utah, J. A. Hale, Utah Power & Light Co.; vice-president for Washington, Lewis A. Lewis, The Washington Water Power Co.; vice-president for British Columbia, E. H. Adams, B. C. Electric Railway Co.; members-at-large of Executive Committee, to represent utilities, T. E. Roach, Northwestern Electric Co., and to represent manufacturers and jobbers, Charles H. Cutter, Pacific Electric Mfg. Corp., and D. M. Salsbury, Westinghouse Electric Supply Co.

President Bragg reappointed Berkeley Snow, Portland, to be executive secretary.

The association passed a resolution pledging "wholehearted devotion and energy of the individual institutions we represent to the cause of victory over the foes of democracy and freedom and the other decencies of life," and "wholehearted cooperation to the governments of Canada and the United States in their programs for carrying out the war on the active fronts and their programs of conservation, production, finance and all other features of wartime economy rendered necessary on the home front."

Rocky Mountain League

Tom-toms of the Kee-Lo-Watt tribe, which in previous years have begun sounding off about this season, are stilled so far as the Rocky Mountain Region is concerned. The customary activities preliminary to the Rocky Mountain Electrical League's annual convention are strangely lacking, due to the fact that this ceremonial event will not take place in the accustomed manner. Big Chief (President) Gaylord B. Buck and Little Chief (Manager) George E. Lewis announce that too many warriors of the Kee-Lo-Watt clan are actively on the warpath or engaged in related work to dance around the tribal fires. However, a conference of the "bucks" will take place Sept. 25 and 26 in Denver, Colo. No "squaws" will be present; it will be all war talk for men only. Important "Chieftains" of electric utilities, distributors, contractors and dealers from Colorado, Wyoming and New Mexico will be there, providing a full representation of leaders in the Kee-Lo-Watt tribe, although only a skeletal turnout compared with those of former years.

Important matters touching on policy to govern future RMEL activities will be decided at the September event. A very complete program designed to provide an accurate picture of the status quo in the mountain states electrical industry has been arranged; and reports from various committees and bureaus, appointed to study conditions and recommend procedure on many troublesome fronts, will be received and acted upon. These strictly business matters and election of officers for next year (the fiscal year begins Jan. 2, 1943, though officers are chosen in September) will occupy the entire two-day session. Manager Lewis will attend the International Assn. of Electrical Leagues' convention at Cleveland, Ohio, Sept. 17-19, and submit a report of the proceedings to RMEL delegates the following week. Another important convention whose deliberations will be reported to RMEL's business conference is that of the Rocky Mountain Chapter, IES, which will occur in Denver, Sept. 21 and 22.

IAEI at Fresno Sept. 21-23

Announcing the names of speakers who will present the topics of interest to electrical inspectors at the annual meeting of the Southwestern Section, IAEI, at Fresno, Sept. 21-23, Harold L. Gerber, secretary, also said that results of a postcard poll indicated a fine attendance in prospect. The problems facing the electrical inspector are so complex, these days of materials shortage and substitution, that cities and towns having inspection departments need the benefit of each others' experience. Clifford Prud'homme, Sacramento, is president.

John S. Parsons, industry engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, will present a paper on *Factory Network Systems.* Lester Siebert, manager, Trumbull Electric Mfg. Co., San Francisco, will talk on *Application of Busways in War Production Plants.* Jared A. Hill, electric sales engineer, Pacific Gas and Electric Co., will speak on *The Effect of Priority Orders on Utility Operations.*

Marion H. Hedges, research department, International Brotherhood of Electrical Workers, Washington, D. C., will speak on *Labor's Part in War Production. Black Light,* an illustrated talk, will be presented by Clifford Walk, lamp division, Westinghouse, San Francisco.

At Monday's noon luncheon Sam Hazleton, Jr., division engineer, lamp department, General Electric Co., Oakland, will present the timely topic, *Highlights and Blackouts.* Tuesday's speakers will be: E. G. Romeiser, field engineer, Porcelain Insulated Wiring Systems, of Union City, Ind.; E. F. Watkins, Southern California Edison Co., and H. H. Courtright, Valley Electrical Supply Co., Fresno, on *The Uniform Electrical Code.*

William L. Gaffney, Tacoma, president, and Victor H. Tousley, Chicago, secretary of the International Assn. of Electrical Inspectors will likewise speak, the latter on Code revisions.

"What are you doing to conserve vital materials and keep your equipment running?" was to be the topic of general round table discussion at the Aug. 27 meeting of the Electrical Maintenance Engineers Assn. of Northern California, meeting in San Francisco. At a previous meeting, WPB spokesman Edwards told maintenance men that if there was any way to keep equipment running with haywire or ingenuity rather than call for parts or critical materials, they were expected to do so. This gave birth to the idea of a meeting devoted to swapping ideas on maintenance. Jack Cochran, president, was in charge.

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PCEA Panorama — Edited by Mary Shoop

Who Am I?

I was born in Whitewater, Wis., Feb. 17, 1880. I moved to Winchester, Calif., in 1887 where I attended public school and was graduated from Hemet Union High School in 1898, moving to Riverside shortly after. I was graduated in 1902 from Throop Polytechnic Institute, predecessor of the California Institute of Technology. During summer vacations I worked at the printing business and while at Throop I published the college magazine. After graduation from college, I worked as a draftsman for the Axelson Machine Co., in Los Angeles and later installed the hydro generating plant of the Riverside Power Co. near Arlington and afterward operated the plant. Who am I?

In 1905 I accepted a position in the testing department of the General Electric Co., at West Lynn, Mass., transferring later to Schenectady. After two years in the commercial department I went to the Los Angeles General Electric office in 1909 as general salesman. In 1912 I was appointed manager of the supply department, and in 1920 was made assistant manager, the position I held until 1928. In 1930 I became president and general manager of the Quality Electric Co., Ltd., Los Angeles, the position I now hold. The company now is doing 96% war production work. Who am I?

I am member No. 1 of the Los Angeles Electric Club and chairman of the Board of Examiners of Electricians, Los Angeles County. I am a member of Arlington Lodge No. 414, F. & A. M., Al Malaikah Shrine, executive committee of the Southern California chapter of the National Electrical Contractors Assn., Los Angeles Chamber of Commerce and the board of directors of PCEA. Who am I?

I am married, have a daughter, Marjorie, and a son, Bob, who is associated with me in business. My hobby is my home and gardening. I live in Oakmont Country Club Estates in Glendale and my name is: See page 89.

Fall Conclave Set

"Electric Power—Dedicated to Victory" is theme

"ELECTRIC Power—Dedicated to Victory" will be the theme of this year's PCEA fall conclave to be held Thursday and Friday, Oct. 22 and 23, at the Hotel Californian in Fresno. The entire program will center about the industry's present and probable future relation to the war.

A general assembly will open the conclave on Thursday morning, and the closing event will be another general gathering Friday afternoon at which the post-war planning committee, under the chairmanship of R. E. Fisher, will make a timely and valuable presentation. President S. E. Gates will preside at these sessions. Luncheon programs each day will feature prominent speakers. Following is a preliminary outline of the program:

Business Development Section

The section will meet as a whole during the entire conclave. There will be no parallel sessions.

Thursday, Oct. 22—F. C. Angle, presiding
Morning, discussion of agricultural problems; A. D. Bragg, sponsor, A. M. Frost, discussion leader.
Afternoon, discussion of industrial problems; R. C. McFadden, sponsor, A. L. Laws, discussion leader.

Friday, Oct. 23—P. P. Pine, presiding
9 to 10 a.m.: Lighting problems; F. J. Wellhouse, discussion leader.
10 to 11 a.m.: Code and ordinance committee meeting; E. F. Watkins, presiding.
11 to 12 a.m.: Maintaining the dealer; Clark Chamberlain, discussion dealer.
Afternoon: general assembly.

Administrative Services Section

Thursday, Oct. 22—L. C. Rausch, presiding.
Six groups will hold parallel meetings:
1. Credits and collections, J. A. Long, sponsor.
2. Accounting, F. C. McLaughlin, sponsor.
3. Purchasing and stores, Wm. de Waard, sponsor.
4. Personnel, L. J. Nevraumont, sponsor.
5. Customer relations, George Tenney, sponsor.
6. Legal department—a new addition, S. W. Scarfe, sponsor, G. C. Larkin, discussion leader.

Friday, Oct. 23
Morning
9 to 10:30: Customer relations
10:30 to 12: Personnel
These subjects will be considered in their broad, industry-wide aspects as compared to their discussion in details of their operation in Thursday's parallel sessions.
Afternoon: general assembly

Operating Economics Section

Thursday, Oct. 22
Morning: general session of the section, H. A. Lott, presiding; Synthetic rubber and integrated operation are the two subjects to be discussed.
Afternoon: parallel group discussions as follows:
1. Safety.
2. Steam generation.
3. Transportation.
4. Substation and apparatus.
5. Hydro-generation.
6. Metering.
7. Transmission and distribution.

Friday, Oct. 23
Morning: continuation of parallel sessions.
Afternoon: general assembly.

Electriquiz

L. C. Rausch and others at the Santa Cruz district office of the Coast Counties Gas and Electric Co. present this timely quiz.

1. The oldest hydro-electric power plant in California in use at the present time is located:
   a. On Pitt River.
   b. On Hetch-Hetchy.
   c. On Big Creek, Santa Cruz.
   d. On Huntington Lake.
2. What is the ultimate capacity in kw. of Shasta Dam?
   a. 50,000 kw.
   b. 250,000 kw.
   c. 379,000 kw.
   d. 1,000,000 kw.
3. The first call on any dividends from the profits of a public utility is received by:
   a. Common stock holders.
   b. First preferred stock holders.
   c. Bond holders.
   d. Second preferred stock holders.
4. Recently one of the world's largest hydro-electric plants was destroyed. Where was this plant located and why was it destroyed?
5. The kilowatt-hour output in the United States for the week ending July 11, 1942, as compared to the week ending July 11, 1941, shows what percentage of increase or decrease?
   a. 2.5%.
   b. 3.0%.
   c. 12.1%.
   d. 7.9%.
6. The total number of customers for California in 1941 in relation to the rest of the United States was:
   a. 2.0%.
   b. 5.0%.
   c. 7.8%.
   d. 25.0%.

See page 89 for the answers.

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Questions in Order

What would you like to know about the industry, about PCEA or any electrical matter? Send in your questions now to PCEA, 447 Sutter St., San Francisco, or 601 W. Fifth St., Los Angeles, and they will be answered at the PCEA district meeting nearest you. Prominent industry leaders will comprise a board of experts who will reply to questions you and other members have submitted.

Also on the district meeting program will be a discussion of the important part the industry is taking in the war effort and a forecast of post-war industry conditions. It will be given at northern meetings by R. G. Kenyon, assistant vice-president, Southern California Edison Co., and at southern meetings by A. C. Joy, advertising manager, Pacific Gas and Electric Co.

President S. E. Gates will preside at the meetings, which will be held as follows:

Sept. 24, San Jose; Sept. 22, Bay Region; Sept. 25, Sacramento; Sept. 24, Stockton; Sept. 23, Fresno; Sept. 22, Bakersfield; Sept. 30, Pasadena; Oct. 1, Pomona; Oct. 2, Montebello; Oct. 5, Santa Monica; Oct. 6, San Bernardino; Oct. 7, Santa Ana; Oct. 8, San Diego; Oct. 9, Long Beach.

PCEA Committees

New PCEA committee members for this year are as follows:

Industry Information Committee

M. W. Phillips, chairman.

G. H. P. Dellmann, San Diego Gas & Electric Co.; H. Dewes, California Electric Power Co., Riverside; H. H. Fogwell, Thermador Electric & Mfg. Co., Los Angeles; H. H. Courtright, Valley Electrical Supply Co., Fresno; R. G. Holabird, National Electrical Products Co., Los Angeles; H. S. Schuler, Westinghouse Electric & Mfg. Co., San Francisco; I. W. Borda, The Okonite Co., San Francisco; A. D. Bragg, General Electric Co., San Francisco; R. R. Walbridge, Southern California Edison Co., Los Angeles; E. A. Long, Pacific Gas and Electric Co., San Francisco; G. C. Tenney, ELECTRICAL WEST.

Code and Ordinance Committee

B. C. Hill, Chief of the Department of Electricity, City of Oakland, chairman. A. L. Stone, Stone Electric Supply Co., Los Angeles, vice-chairman.

D. E. Harris, G-E Supply Co., San Francisco; J. O. Dillingham, G-E, San Francisco; C. E. Heise, retired, formerly with Westinghouse; M. Kennedy Bliss, Board of Fire Underwriters, San Francisco; Arthur Veit, Chief Electrical Inspector, Los Angeles County; H. L. Harper, Graybar Electric Co., Los Angeles; E. F. Watkins, Edison Co., Los Angeles; E. A. Long, P G and E, San Francisco; H. H. Courtright, Valley Electrical Supply Co., Fresno; M. G. Sues, Leo J. Meyberg Co., Los Angeles; W. E. Cranston, Jr., Thermador Co., Los Angeles.

Red Seal Adequate Wiring Committee

H. C. Rice, Edison Co., Los Angeles, chairman.

A. I. Benedict, San Diego Gas & Electric Co.; J. O. Dillingham, G-E, San Francisco; J. A. Hill, P G and E, San Francisco; A. B. Smedley, Anaconda Wire & Cable Co., Los Angeles.

Highway Lighting Committee

A. E. Holloway, San Diego Gas & Electric Co., chairman.

R. E. Fisher, P G and E, San Francisco; R. C. McFadden, Edison Co., Los Angeles; D. B. Wheelock, California Electric Power Co., Riverside; H. W. Edmund, Coast Counties Gas and Electric Co., Santa Cruz.

Technical Sub Committee Highway Lighting Committee

G. H. P. Dellmann, San Diego Gas & Electric Co., chairman.

W. P. Bear, P G and E, San Francisco; Carl Koch, G-E, San Francisco; Milo Cain, Coast Counties Gas & Electric Co., Santa Cruz; G. M. Rankin, Edison Co., Los Angeles; L. W. Luley, Westinghouse, Los Angeles; F. J. Wellhouse, Westinghouse, San Francisco; L. W. Towner, G-E, Los Angeles; H. G. Dillin, San Diego Gas & Electric Co.; G. C. Delvaille, California Electric Power Co., Riverside; Rudolph Jenney, P G and E, San Francisco; J. E. Hammond, San Joaquin Power Division, P G and E, Fresno.

School Lighting Committee

G. M. Rankin, Edison Co., Los Angeles, chairman.

A. I. Benedict, San Diego Gas & Electric Co.; J. S. Walsh, P G and E, San Francisco; Clark Baker, Sight Conservation Council, San Francisco; F. A. Hansen, Western Institute of Light and Vision.

Post-War Planning Committee

R. E. Fisher, P G and E, San Francisco, chairman.

H. H. Courtright, Valley Electrical Supply Co., Fresno; R. C. McFadden, Edison Co., Los Angeles; R. M. Alvord, G-E, San Francisco; H. L. Harper, Graybar, Los Angeles.

Publicity Committee

J. A. Corlett, G-E, San Francisco, chairman.

Charles P. Johnson, Westinghouse, San Francisco; A. C. Joy, P G and E, San Francisco; F. M. Raymond, San Diego Gas & Electric Co.; H. W. Hayes, Edison Co., Los Angeles; W. A. Cyr, ELECTRICAL WEST.

Distribution Line Committee

S. J. Lisberger, P G and E, San Francisco, chairman.

A. C. Putnam, California Electric Power Co., Riverside; G. E. Jenner, San Diego Gas & Electric Co.; C. E. Young, P G and E, San Francisco; H. H. Minor, San Joaquin Power Division, P G and E, Fresno; H. E. Jung, Edison Co., Los Angeles.

Budget Committee

P. M. Downing, P G and E, San Francisco, chairman.

I. W. Borda, The Okonite Co., San Francisco; S. W. Scarfe, G-E, Los Angeles; N. R. Sutherland, P G and E, San Francisco; V. W. Hartley, PCEA, Los Angeles.

Membership Committee

I. W. Borda, The Okonite Co., San Francisco, chairman. S. W. Scarfe, G-E, Los Angeles, vice-chairman.

S. R. Robinson, San Diego Gas & Electric Co.; L. G. Peck, California Electric Power Co., Riverside; H. P. Dayton, Sierra Pacific Power Co., Reno; A. J. Bronold, Westinghouse, Los Angeles; Hugo Becker, Westinghouse, San Francisco; S. W. Murray, Westinghouse Supply Co., Los Angeles; A. D. Bragg, G-E, San Francisco; F. C. Todt, G-E Supply Co., Los Angeles; Arthur Dahl, G-E Supply Co., San Francisco; J. G. Pyle, General Cable Corp., Los Angeles; C. D. Russell, Associated Wholesale Electric Co., Los Angeles; E. F. Gould, Anaconda, Orange; F. A. Mulvany, Maydwell & Hartzell Co., San Francisco; E. A. Long, P G and E, San Francisco; E. R. West, Edison Co., Los Angeles.

Farm Electrification Handbook Revision

Lyle W. Smith, Edison Co., Visalia.

Industrial Power and Heating Handbook Revision

A. L. Laws, Edison Co., Vernon.

Meetings

Electrical League of Utah had scheduled regular monthly meetings of Sept. 28 and Oct. 26, at the Beau Brummel Cafe; speakers and subjects not yet being determined.

San Francisco Bay Chapter, National Electrical Contractors Assn. held a special meeting Aug. 20 to discuss instructions to its delegate to the national convention at Bigwin, Ontario. Joe Carlson, Central Electric Co., San Francisco, was appointed delegate. President Clyde L. Chamblin, who is vice-president of the labor relations committee of NECA, also intended going. Visitors were Warren Penn, new executive secretary, Los Angeles chapter, NECA, and Richard Arbogast, of Newbery Electric Corp.

In the interests of the war effort, the Pacific Coast Division of NEWA has cancelled its convention originally scheduled for Sept. 10-12 at Del Monte, Calif.

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NEWS of the industry

WESTERN PROJECTS GIVEN HIGH PRIORITY RATINGS

High priority ratings were granted a number of Western projects following the War Production Board order which limited new generating capacity to be installed for the duration to 5,300,000 kw. as compared with the 9,600,000 kw. of generators for which orders had been placed.

Those Far Western installations which were included in the 5,300,000-kw. national total were assigned AA-3 and AA-4 ratings under the new schedule of priorities superimposed on the present A series. Many proposed installations were thrown overboard for the duration so that manufacturing capacity could be diverted to marine propulsion production.

Pacific Gas and Electric Co. received AA-3 preference ratings for its 27,000-kw. Dutch Flat and 11,000-kw. Upper Narrows projects. Pit No. 5, a 146,000-kw. installation was assigned an AA-4 rating.

Bureau of Reclamation power projects which received high ratings were Boulder Dam, Grand Coulee, Parker Dam, Green Mountain, Shasta Dam and Keswick Dam. The U. S. Engineers' Bonneville plant received ratings for the last four of the ten 50,000-kw. units to be installed in that plant.

At Boulder Dam one 85,000-kw. unit to be installed this year was given an AA-3 and another to go into service in 1943 was assigned an AA-4. Four 30,000-kw. units at Parker Dam to be in service in 1942 were classed as AA-3. The two Shasta Dam 75,000-kw. units now being installed at Grand Coulee were assigned AA-3 while three 108,000-kw. Coulee units received an AA-4 rating. Three 75,000-kw. units for Shasta Dam were rated AA-4 as were two 25,000-kw. generators for Keswick Dam. Neither of these units of the Central Valley Project in California are scheduled for completion until 1944. Two 10,800-kw. units for the Green Mountain project were given AA-4.

The 65,000-kw. Harbor steam plant of the Los Angeles Bureau of Power & Light and the 40,000-kw. Silver Gate plant of the San Diego Gas & Electric Co. also were assigned ratings in the AA category.

Eliminated from consideration were Units 7, 8 and 9 in the right power house at Grand Coulee as well as all units in the left bank station. Tacoma Light Department's Nisqually development with two 25,000-kw. and one 40,000-kw. units.

Another of the projects eliminated was the Bureau of Reclamation's $18,996,392 dam and power project on the Colorado River. This project, for which contract had been let, included a rock and earthfill dam located 67 miles downstream from Boulder and a power plant to house five 45,000-kva. generators.

In all work on 85 proposed projects —private and government owned—was halted.

All Utility Expansion Now Requires WPB Authorization

Construction of electric light and power projects which had been permitted under prior authorization with respect to installations 40% complete on Dec. 5, 1941, was stopped by the War Production Board on Aug. 13 because of the increasing need for conservation of critical materials. The order applied to public and private utilities and to electric cooperatives financed with REA funds.

Important war projects specially authorized by the WPB are not affected by the action, which took the form of amendment No. 3 to Preference Rating Order P-46. The new amendment in addition to halting projects that were 40% complete on Dec. 5, provides that there may be no additions or expansions to electric systems except as specifically authorized by the Director General of Operations of the WPB.

Aluminum Capacity Upped In Northwest with Fifth Plant

Pacific Northwest aluminum production capacity was increased in August when the fifth reduction plant in that area, the Olin Corp. installation, began operation. The plant, with a demand of 40,000 kw. supplied from the Bonneville-Grand Coulee network, was built by the Defense Plant Corp. Olin Corp. is the third company to enter the Northwest aluminum field, the others being the Aluminum Co. of America and the Reynolds Metals Co.

Bonneville Power Administration is supplying slightly under 400,000 kw. to aluminum operations in that area and this may be increased to 600,000 kw. when all reach full capacity. Still under construction is a large aluminum rolling mill, which will bring the number of plants to six and the investment in aluminum facilities to $116,000,000 in the area.

SEATTLE HITS ANOTHER SNAG ON DAM PROJECT

Rising construction costs which would add more than $2,000,000 to the original estimate, last month caused Seattle City Light to suspend its plan to increase the height of Ross Dam on the Skagit river.

Upon recommendation of City Light Superintendent E. R. Hoffman, call for bids was cancelled on the sale of $7,900,000 of revenue bonds and decision upon construction contracts was postponed pending word from the War Production Board, which originally requested the undertaking. Call for bids on the bonds was withdrawn once before, when difficulty over priorities temporarily halted the project.

The proposed addition would increase the height of the dam 180 ft. to 470 ft. above bedrock and would increase the storage behind the structure from 100,000 acre-ft. to 676,000 acre-ft.

"Cost of doing the work in the last three months has increased tremendously," Hoffman said. "At time of estimate, a few months ago, $8,300,000 would have been ample to complete the second step of Ross Dam. Since then the cost has jumped $2,230,000, to a total of $10,530,000, far beyond our means.

"Unless the Federal authorities, through the WPB, see fit to provide the difference in cost, this project will not be carried out. It would place too great a burden on City Light which, after all, is the property of Seattle. We would like to authorize the construction, and believe the government would, too, but pending definite word from the WPB, all bids will be held in abeyance."

● TECHNICALLY QUALIFIED PERSONNEL, including electrical, mechanical and civil engineers, is needed by the U. S. Maritime Commission at its regional office in Oakland, Calif. This newly established office is responsible for effecting the Commission's ship construction program for the entire Pacific Coast. Persons interested may get in touch with E. G. Montgomery, chief of personnel section, Financial Center Building, 14th & Franklin Sts., Oakland.

● AN RFC LOAN of $600,000 has been obtained by Oregon Electric Steel Rolling Mill to supplement the $1,000,000 expenditure the company is making for the construction of a 30,000-ton steel mill in the Portland area.

BUYING LARGE POWER TRANSFORMERS?

You Can Save with

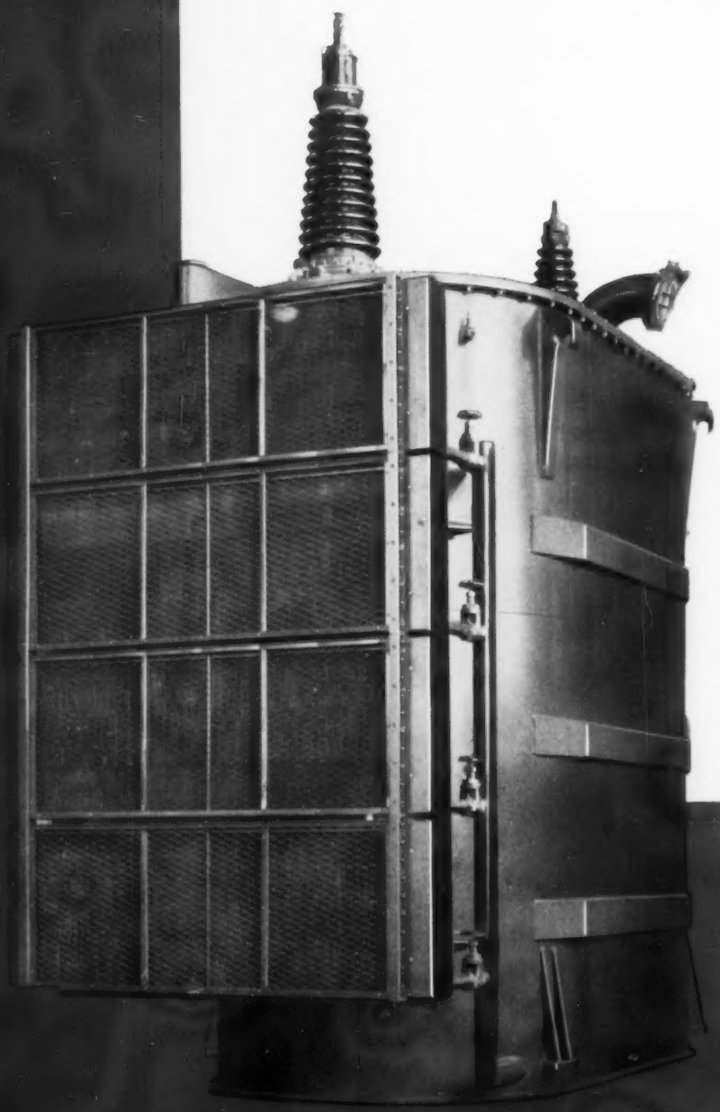
G-E Forced Cooling

. . . from 5 to 20% in Purchase Price FOR YOURSELF . . . up to 30% in Critical Materials FOR UNCLE SAM

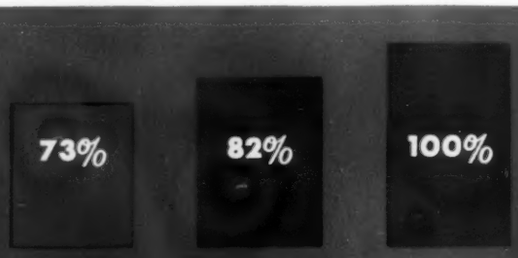
To reduce drastically the amount of materials required by large power transformers, General Electric has developed a forced-cooled transformer, in which the oil is pumped through fin-type forced-air coolers.

These transformers can save as much as 30 per cent in copper and steel—in ratings 20,000 kva and above—compared with self-cooled transformers of the same kva and voltage ratings. For example, in one case involving three 20,000 kva, 138,000-volt, single-phase, 3-winding transformers, forced cooling released 18,000 lb of copper and 57,000 lb of steel for the war effort—and saved the purchaser nearly $24,000.

This type of cooling was first applied by General Electric on transformers for electric locomotives and mobile substations, where it effected great savings in size and weight. Aggressive developmental work has now made similar benefits available to purchasers of large G-E power transformers for station application.



G-E forced-cooled (forced-oil, forced-air-cooled) transformer. Single-phase, 3-winding, rated 40,000 kva, 138,000 volts, 60 cycles

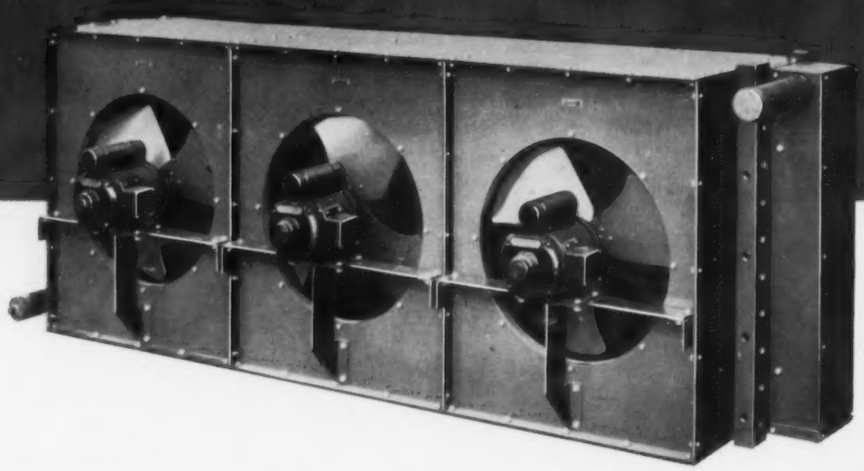


Comparison of amount of copper and steel required by three types of transformers (40,000 kva, 138,000 volts, single-phase, 60 cycles)

SEE NEXT PAGE FOR DETAILS

GENERAL ELECTRIC

YOU CAN SAVE WITH FORCED-COOLED TRANSFORMERS



Rear view of standardized 3-fan cooler section

HOW G-E FORCED COOLING WORKS

IN the G-E forced-cooled (forced-oil, forced-air-cooled) transformer the oil is pumped through a fan-cooled, fin-type cooler. In this cooler a great amount of radiating surface is concentrated within a relatively small space, from which the heat is removed by forced air. The cooler is assembled from standardized sections, providing maximum flexibility of application together with all the advantages of quantity production.

The fans are specially designed for efficient operation in all kinds of weather.

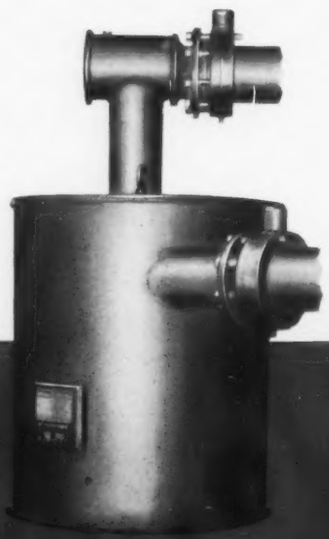
The oil pump and motor are enclosed in a completely metal-sealed, oil-tight container through which the circulating oil flows. This unique design provides a positive liquid-tight pump having no stuffing box and requiring no maintenance.

The cooler is completely factory-assembled and is normally shipped in place on the transformer tank, thus simplifying installation.

For Your Present Installations, Too

Forced cooling can also be used to increase the capacity of power transformers already installed by augmenting—or completely replacing—self-cooled, air-pressure-cooled, or water-cooled systems.

Your G-E representative will be glad to obtain for you detailed recommendations covering G-E forced-cooled power transformers for your requirements. Ask for Bulletin GEA-3934. *General Electric, Schenectady, New York.*



Motor and pump in oil-tight container—no stuffing-box—no gaskets—no leaks

The Navy "E" for Excellence has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment

GENERAL ELECTRIC

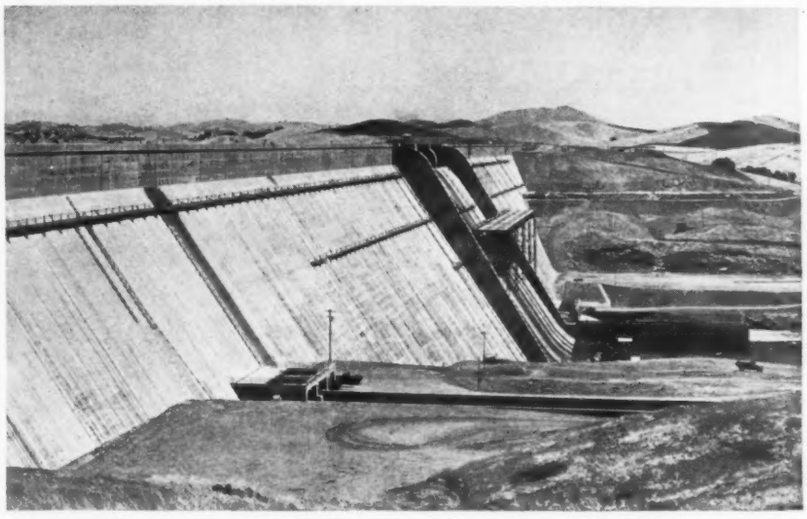
401-3-5150

STRIKE SLOWS WORK ON LOS ANGELES SYSTEM

An unauthorized "job action" strike of linemen, members of the International Brotherhood of Electrical Workers, slowed construction on the system of the Los Angeles Bureau of Power & Light for 10 days during August. Initiated by the half of the Bureau linemen who are union members, the walkout was over demands of the union for an increase from $210 to $250 per month.

Final settlement was effected when the Department of Water and Power announced a $15 per month increase in salary classifications under $300 monthly, effective Sept. 1. Some individual classifications recently granted increases were omitted from the general raise. Toward the end of the outlaw strike upwards of 900 of the 1,000 Bureau employees who are members of the IBEW were affected. Because civil service regulations automatically terminate civil service standing if an employee is absent without authorization for more than five days, the union rotated workers on the jobs.

During negotiations officials of the Department of Water and Power cited a recent survey showing wages of approximately 800 first class linemen working in the large cities of the Pacific Coast to average $208.85 monthly.



Fourth largest concrete dam in the world, Friant dam in the Central Valley project is virtually complete and soon will provide supplemental irrigation and flood control in the upper San Joaquin valley of California. This Bureau of Reclamation photo shows the downstream face of the dam looking south, the Madera Canal outlet-works valve-house and stilling basin in the foreground

Labor Dispute Interrupts War Installations

Work on the Dutch Flat and Upper Narrows hydroelectric projects of Pacific Gas and Electric Co. was held up temporarily for five days last month as a result of a jurisdictional labor dispute which threatened to close down both jobs completely.

The dispute, which was unauthorized, arose when members of the Millwrights Union, an affiliate of the Brotherhood of Carpenters, claimed the right to install power house machinery as against the Machinists International. Both jobs were picketed and partially closed down. After meeting with a WPB labor mediator, work was resumed.

It was pointed out that both projects are important war installations which have just recently been given AA-3 priority ratings.

● VALUE OF A POWER SITE at the Narrows of the Spokane River, flooded with the erection of Grand Coulee dam, will be determined in a suit before a jury in the Federal court at Spokane commencing Oct. 13. The site is owned by the Big Bend Transit Co., a wholly-owned subsidiary of the American Power & Light Co., holding company for Washington Water Power Co.

Arizona Gets Third Payment From Boulder Dam

Arizona has received the third $300,000 annual payment from Boulder Dam power revenues in lieu of taxes on the basis of a compromise worked out when Boulder power rates were last revised. Back payments totaling $600,000 are yet to be received and then annual payment will continue at the $300,000 rate for a total period of 50 years.

Under terms of the original Boulder Canyon Project Act, Arizona and Nevada were each to receive 18% of excess revenues from power sales in lieu of taxes. However, because the act permitted revision of power rates at 10 year intervals, Arizona became fearful that such revision might preclude revenue payments. The state sought a compromise and settled for $300,000 annually.

$14,769,685 Cost Set on Puget Sound Development

Original cost of Puget Sound Power & Light's Rock Island development on the Columbia River has been established by the Federal Power Commission as $14,769,685.29 in an order handed down Aug. 10. The company had claimed $15,904,514.47.

Principal differences arose over interest charges during construction and fees paid to the Stone & Webster Engineering Corp., an affiliate of Puget Sound. The FPC disallowed $587,871.76 of interest costs on the contention that the project could have been completed earlier than the date set by the company. It held that construction was delayed during the 1932-33 depression period because the plant was not needed to meet system load.

Fees and percentage charges for management services paid Stone & Webster were reduced $424,231.17 by the elimination of charges which the commission held were not justified.

War Production Classes Initiated at Stanford

Three Engineering, Science and Management War Training courses of interest and importance to electrical engineers will be initiated during September by Stanford University. They are part of the war production training program.

Vector and tensor analysis will be covered in a 20-week course to be given at Stanford commencing Sept. 30. Classes will be on Wednesday evenings.

Marine electrical theory and apparatus will be taught in two classes, one in San Francisco Thursday afternoons and one in South San Francisco on Thursday evenings. Both commence Oct. 1 and run for 12 weeks.

Ultra-high-frequency techniques will be covered in a course in San Francisco meeting Monday and Wednesday evenings commencing Sept. 28 and extending for 23 sessions. Information on all ESMWT courses under the jurisdiction of Stanford may be obtained from room 265-A Engineering Bldg., Stanford University.

Win the WAR ON WASTE

• Now is the time to wage war on waste. Food conservation—labor, fuel and energy can best be done the electric way.

Many users of Lang electric commercial cooking appliances tell us of their experiences in saving, speeding up operations and in turning out better quality meals. Lang construction assures long life and efficient operation. Lang automatic controls save time and effort of chefs.

Today, Lang is building for the army, navy and—Victory. These orders are the FIRST orders of the day. However, we can take care of our commercial customers, too.

We urge anyone considering the purchase of Lang electric equipment to plan ahead and order ahead.

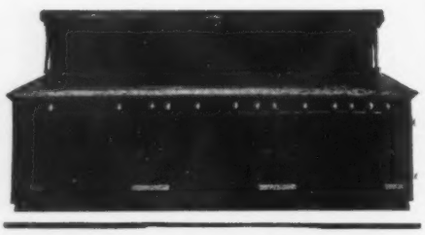
F. S. LANG MFG. CO.

Portland—Seattle—Spokane

Builders of

LANG

STANDARD AND CUSTOM-BUILT HEAVY DUTY ELECTRIC RANGES, COOKING TOPS, OVENS, GRIDDLES.



WPB HALTS PRODUCTION OF DOMESTIC WATT-HOUR METERS

WPB ordered a halt last month in production of domestic watt-hour electric meters for the duration so as to convert meter manufacturing facilities to war work, and took steps to reserve the stockpile of meters on hand for utilities and the military forces. Order L-151 fixed Sept. 26 as the cutoff date for production and restricted output until that date to 2½% of the total output in all 1941. The order also stopped immediate delivery of watt-hour meters except on utility orders issued under Order P-46 on orders of Army, Navy, Maritime Commission, or War Shipping Administration, or on direct authorization of WPB on Form PD-423.

The stockpile of meters in manufacturers' and utilities' inventories is considered sufficient by WPB to take care of essential replacements and of new housing construction.

Domestic watt-hour meters are defined by the order as including single-phase, two and three-wire types, with capacities up to 25 amp. and voltages up to 240 volts, for use on alternating current of any frequency. Polyphase, demand and other types of meters used for industrial purposes are not affected.

At current rates of production, WPB estimates that the cutoff order "frees" 750,000 lb. of copper and three million jewels for war uses. Meter manufacturers, it is stated, will convert their production facilities to manufacture of precision-type combat instruments, gauges, measuring devices and similar military equipment.

Stocks Offered For Sale May Be Eliminated From P-46

Surplus materials and equipment in utility inventories may now be excluded from the limitations of Order P-46 where utilities offer the stocks for sale to other utilities for wartime construction and maintenance.

The segregation should be made on the second quarter PD-194 forms now in utilities' hands from the Federal Power Commission, upon which inventories and withdrawals during each three-month period are reported to WPB under terms of P-46. Separate reports listing all inventory designated as for sale should also be sent in the form prescribed in instructions accompanying the PD.-194s.

The new procedure is designed to implement the voluntary canvass made last April for materials utilities were willing to offer for sale, and to encourage the fullest response of industry cooperation in order to conserve critical materials.

Two practical benefits are available to utilities which segregate inventory and offer unneeded material for sale. In the first place, permission to eliminate material offered for sale from the P-46 inventory report makes it possible for a utility which had large stocks of construction inventory when P-46 became mandatory to comply with the order's Section F limitation regulating the size of permitted stores. Secondly, the new procedure offers a means by which utilities with excess stocks of one kind of wire, for instance, can make themselves eligible to use the P-46 priority ratings in obtaining needed supplies of a different kind of wire.

G-E Man Sees Big Industrial Future For Pacific Coast

Future industrial possibilities of the Pacific Coast due to intensified wartime industrial activity brought forth favorable comment from E. O. "Bill" Shreve, General Electric vice-president in charge of apparatus sales, during an extended survey of Coast installations which ended last month.

"The most remarkable thing about the West today," Shreve said, "is the emphasis from border to border in developing a self-contained industrial structure. After the last war shipbuilding almost disappeared from the West Coast because steel had to be shipped here from the East, but this industry will remain after the present war as a result of steel mill construction in this region.

"Aluminum and magnesium being produced here will replace many metals we use today. California, Oregon and Washington possess 30% of the nation's potential water power and with these resources, I see no reason why numerous new industries will not be developed in peacetime."

Shreve visited all of the General Electric Western offices during his stay on the Coast.

• OF INTEREST to companies dealing directly or indirectly with the Army, Navy or Procurement Division of the Treasury Department as contractors or subcontractors is a government pamphlet entitled, *Explanation of Principles for Determination of Costs Under Government Contracts.* This pamphlet, which may be secured from the Superintendent of Documents, Washington, D. C., for 10c, gives for the first time in printed form a definite outline of the manufacturing and other contract performance cost items, and expenses of an administrative and distributive nature which are allowable under contracts with the three government agencies.

This tail wags the "dog"

An achievement of Anaconda research aiding both our war effort and our industry.

MINES . . . one of the necessities of our gigantic war effort . . . today rumble with the noise of *work*. To keep this rumbling rhythm steady and incessant, mining machines and transportation systems use large quantities of electrical power.

Here, a bustling locomotive carries its electrical power around with it . . . like a tail. Over sharp-edged rails, thumping over shaggy, splintered ties, reeling and unreeling as the locomotive moves back and forth, the "tail" . . . the copper power cable . . . stands up day after day delivering the ever-so-vital power without interruption.

Sunex Securityflex*, a product of Anaconda research developed to withstand not only the rough and tumble conditions of underground mining but also the sun blistering service of open pits, is the "tail" that's wagging many mining dogs. And the research that built it, the invaluable hours of patient experimenting and testing, now speeds to develop copper wires and cables for an even more potent war effort . . . for a greater industrial front . . . for use in mines, in war-vital plants, in bombers and battleships. 42243

*Trade Mark Reg.

ANACONDA
from mine to consumer

This familiar trade-mark symbolizes the best efforts of modern research and production.

ELECTRICAL WIRES AND CABLES OF COPPER ARE THE LIFE LINES OF OUR NATION

ANACONDA WIRE & CABLE COMPANY

Subsidiary of Anaconda Copper Mining Company

GENERAL OFFICES: 25 Broadway, New York City • CHICAGO OFFICE: 20 North Wacker Drive • Sales Offices in Principal Cities

"Praise the Lord and *Pass the Ammunition*"

THIS Pearl Harborism,* uttered by a fervent Navy chaplain, will live in our school books long after today's headlines and swaying battle lines have passed into history.

It exactly expresses the unique combination of the spiritual and the practical which is inherent in our national character.

. . And America IS *passing the ammunition.* Starting with an atrophied military explosives industry in 1939, the Production for Defense program had raised the rate of "passing the ammunition" by 1400% at the time the chaplain spoke.

▶ Since then, according to an official statement of Donald Nelson:

"Explosives and ammunition are being made at many times the rate of last year as newly constructed plants come into operation. TNT is being made at a rate five times that before Pearl Harbor. Smokeless powder is being produced at a rate almost twice that before Pearl Harbor. One new plant is making more TNT today than the entire explosives industry produced in peacetime and there are several of this type of plant."

Incendiary bombs are vital ammunition in the kind of war we are in. America's chemical industry is far ahead of schedule in passing along that potent ammunition.

Magnesium is part ammunition, part construction material. You know it's now being taken from sea-water, but do you know that we are making at least 100 times as much magnesium now as we did in 1938?

100-octane gasoline isn't ammunition, but it's handy to have around in a war, because bombers using this product of American chemistry can carry an extra ton of what it takes to win.

Synthetic rubber is another necessity in passing the ammunition. The Chemical Industry faces the staggering job of producing more rubber than all the rubber trees in the world were able to pour into the American market prior to the war . . . 875,000 tons per year by 1944 is the goal. Those of us who have seen tank-factories and shipyards grow faster than the corn-crops they replaced believe the Chemical Engineers of America will do the job.

What is the secret of these amazing modern counterparts of the frontiersman's ability to turn from peace to war?

▶ One of the important answers is Chemical Engineering. We just naturally have more men and more machines that know how to make a molecule behave than any two nations on earth.

Starting after World War I, our chemical engineers used the experience gained in guncotton factories to develop the vast peacetime Chemical Industry which gave you rayon, lacquer, transparent wrapping paper, plastic telephones, knockless gasoline, shatterproof glass, synthetic vitamins, laboratory-fathered medicines, plastic tips for your shoe laces, nylon hosiery, and thousands of other comforts to help you live a peacetime Life of Riley.

This vast activity of making life more livable for peaceful Americans had created an enormous pool of management and production men in our chemical industries.

When war came, these men answered their country's call, by rearranging their peaceful atoms into bellicose molecules that would explode, fly, float, shoot or stop a bullet.

Today, fertilizer, salt, whiskey, rayon, even pine stumps are being turned into products of unrecognizable ferocity.

▶ When the war is over, it will be the imagination of the Men of Chemistry that will set our great new war-chemical plants upon a new era of peacetime fruitfulness. Even while the chemical engineer is breaking production records for war, he is planning for a peacetime production that will revert these molecules toward serving our daily lives. Chemical Warfare will become Chemical Welfare, through Imagination.

★ ★ ★

In recognition of the miracle of war production—accomplished through the cooperation of American management and labor with the W.P.B. . . . this 7th in a series of newspaper advertisements is published by the McGraw-Hill Network of Industrial Communication.

*Also title of Gene Lockhart's famous fighting song of World War II

McGRAW-HILL PUBLISHING COMPANY, Inc.

330 WEST 42ND STREET . . NEW YORK

This advertisement appears in a group of newspapers on Wednesday, September 9, 1942

. . . . . and pass the INFORMATION

WHEN an American gunner calls for ammunition, whether he wears a cross—like the chaplain in our newspaper advertisement—or a tattooed mermaid, he sets in motion the mightiest war-machine on earth . . . American Industry.

Knitting together all the industries of America, making it possible for them to turn *quickly* from peace to war, is the Industrial Press.

When the gunner yells for AMMUNITION, industry yells for INFORMATION. It is the job of the industrial magazines to supply it.

"What do we do when we can't get stainless steel for a Toluol recovery plant?"

"Which is the best section of the country for locating our new plant, considering power supply, bombing range and transportation?"

"How can we step-up the alcohol output of our stills, without using scarce metals?"

"What's the best method of training 18,000 green hands to get quick operating efficiency?"

These are typical of the questions that flow over the desks of our editors day after day.

They keep nearly 900 McGraw-Hill editors and engineer-correspondents busy, making field calls, finding the best answer to each problem and reporting the results to management and production men.

Industrial advertisers supplement this work by showing how their products meet specific needs.

This constant interchange of information is part of the strength and adaptability of American Industry.

It is so important that executives are surveying their organizations to make sure that the supply of Industrial Magazines is adequate.

If you would like suggestions as to how to conduct such a survey, write to The Reading Counselor, McGraw-Hill Publishing Company, Inc.

★ ★ ★

THE McGRAW-HILL NETWORK

23 publications, which gather "war-news" from the "war-production-front" through a staff of 153 editors and 725 engineer-correspondents . . . More than 1,000,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

THE McGRAW-HILL BOOKS

Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

McGRAW-HILL PUBLISHING COMPANY, Inc.
330 WEST 42nd STREET • NEW YORK

THE McGRAW-HILL NETWORK OF INDUSTRIAL PUBLICATIONS

American Machinist
Aviation
Bus Transportation
Business Week
Chemical & Metallurgical Engineering
Coal Age
Construction Methods
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Electrical West
Electrical World
Electronics
Engineering & Mining Journal
E. & M. J. Metal and Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Food Industries
Mill Supplies
Power
Product Engineering
Textile World
Transit Journal
Wholesaler's Salesman

If "Copperweld" didn't exist it would have to be created!

WAR eats copper in trainload bites. Copper metal goes directly into munitions and war materiel. And copper wires move and control ships, tanks, subs, planes and other war equipment. Power for war production is transmitted, controlled and created by copper.

Every pound of our Nation's copper supply must be conserved for victory — that's why a copper-saving material, like Copperweld, would have to be created, if it didn't already exist. Copperweld (copper-covered steel) saves up to 70% of copper. The steel core of Copperweld provides mechanical strength. Only enough copper is used to do the job that copper does best—conduct electricity and protect from rust and corrosion.

COPPERWELD STEEL COMPANY · GLASSPORT, PA.

Save hundreds of tons of Copper with COPPERWELD

(COPPER-COVERED STEEL)

FOR COMPLETE INFORMATION ON ANY COPPERWELD DISTRICT OFFICE:

ATLANTA · CHICAGO · CLEVELAND · DALLAS · NEW YORK · SAN FRANCISCO · WASHINGTON, D. C.

Pacific Coast Representative: C. E. INGALLS · RIALTO BUILDING · SAN FRANCISCO, CALIFORNIA

Answer to "Who Am I?"
(See Page 76)
J. O. Case.

Electriquiz Answers

1. On Big Creek, Santa Cruz.
2. 379,000 kw.
3. Bond holders.
4. Dnepropetrovsk on the Dneiper River in Russia. It was destroyed to keep it from falling into German hands.
5. 7.9%.
6. 7.8%. The U. S. total was 31,553,130. California's total was 2,453,000, making the percentage 7.774%.

West to Produce More Heavy Goods is Prediction

That the Western states are certain to produce a much higher percentage of the nation's heavy goods after the war, was the observation of B. W. Clark, Westinghouse vice-president in charge of sales, after a Coastwide survey of wartime industrial development last month. Clark is also president of the Westinghouse Electric Supply Co.

After visiting all of the Westinghouse district offices on the Coast as well as major power developments and industrial installations, Clark stated that optimism over future Western industrial development is justified. Westinghouse recognition of this situation is evidenced by the recently authorized manufacturing expansion at the company's Emeryville plant, he stated.

Even though Westinghouse has a backlog of $800,000,000 of unfilled orders, mostly for war goods, some thought is being given to post-war demands, he said. The company anticipates an immense market for consumer goods, once the war is won.

For that VICTORIOUS OFFENSIVE

All branches of the armed services will use equipment containing alloys made by

WILBUR B. DRIVER CO. — NEWARK, NEW JERSEY

Manufacturers of "TOPHET" the Nickel-Chrome Resistance Wire*

- Nickel-chrome heat-resisting alloys
- Copper-nickel electrical resistance alloys
- Stainless Steels and Monel
- Beryllium-copper alloys
- Carbonized nickel strip and radio filaments
- Special Alloys to your specifications

available in rod, wire, ribbon, and strip both hot and cold rolled

ELECTRICAL SPECIALTY COMPANY, INC.

Pacific Coast Representative

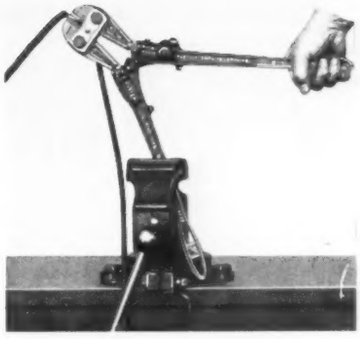
LOS ANGELES 7409 Beverly Blvd. | SAN FRANCISCO 316 — 11th St. | SEATTLE 562 First Ave., So.

*TRADE MARK REG. U. S. PAT. OFF.

Economy In SALVAGE—

Save Your Odd Lengths of LINE WIRE and CONCENTRIC CABLE the Easy Way—With

Nicopress SLEEVES



The Nicopress Method of splicing line wire and concentric cable is especially well adapted for the salvaging jobs. Nicopress line wire joints are quickly made, and exceed the rated breaking strength of the conductor; compact and only a little larger in diameter than the wire they are neat and permit easy coiling.

Nicopress Line Wire Sleeve

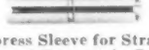
Nicopress greatly simplifies and speeds up the work of splicing concentric cable. Splices are small, neat and easily taped and as the sleeve used for the stranded neutral is split the entire length and the bore chamfered, feeding in the stranded wire is greatly facilitated.

Completed Nicopress Splice

Order Nicopress from your jobber today.

Nicopress Sleeve for Solid Wires of Concentric Cable

Completed Nicopress Concentric Cable Splice



Nicopress Sleeve for Stranded Wire of Concentric Cable

THE NATIONAL TELEPHONE SUPPLY CO.

Manufacturer of Specialties for Power and Communication Lines
5100 SUPERIOR AVENUE CLEVELAND, OHIO

Western Representative—J. E. Winchester, 1101 So. 4th St., Alhambra, Calif.
Canadian Mfr.—N. Slater Co., Ltd., Hamilton, Ont., Canada
Export Distributor—International Standard Electric Corporation, New York, N. Y.

For Better Service—
INSTALL TRICO
REG. U.S. PAT. OFF.
RENEWABLE FUSES
With the famous Powder-Packed Element
KLIPLOK CLAMPS
Lock fuses and clips together
KANTARK FUSES
With genuine fibre tubes (not paper)
COLORTOP PLUG FUSES
The color tells the size
FUSE PULLERS
Pull and replace fuses safely
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Glass and Unbreakable types for every application. Stops guesswork - bearing failures- waste- idle machinery, etc.
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9th & Harrison Sts., Oakland, California
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keep high voltage circuits alive
Now, when revenues are up and expansion is limited, see to it that maintenance crews are properly equipped to make line repairs without interrupting service. See to it that linemen know the right methods to use, and make it a point to be sure that the tools on hand are the best, safest, simplest, and easiest tools on the market to use. Do this, and your maintenance crews will use Tips Tools—still available without delays, at NO INCREASE IN PRICES.
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A·B·CHANCE CO. CENTRALIA MISSOURI

ICKES SEEKS REPORT ON BAY CITY POWER PROGRAM

Just so that San Francisco officials might know that sale of Hetch Hetchy power to a Defense Plant Corp. aluminum plant has not solved the city's power problems, Secretary of the Interior Ickes last month addressed a letter to Mayor Angelo Rossi asking what progress is being made on a permanent power program.

Pointing out that the present sale of power for aluminum manufacture represented only a temporary compliance with the terms of the Raker Act, Secretary Ickes wrote that "it does not tend to bring to the citizens of San Francisco the benefits of low-cost public-distributed electric power as contemplated by the Act."

He expressed interest in San Francisco's plans for extending its water and power system and he added "I should be much interested to learn what plans you have in mind to bring into the city this power which, together with that already developed, would be sufficient to meet the present demand, or what other plans you have for its disposal." He referred to plans for construction of the Red Mountain Bar power plant which have been filed with the National Resources Planning Board as a possible "work reserve" project for post-war construction.

Bonneville Energizes 183-Mile Grand Coulee-Covington Line

Bonneville's 230-kv. transmission loop embracing the Grand Coulee and Bonneville power plants, the Portland-Vancouver industrial area and the Puget Sound industrial region, was completed last month with the energizing of a 183-mile section between Grand Coulee and Covington, Wash. The complete grid measures 594 miles in circumference.

Bonneville engineers claim that the newest 183-mile section is the longest uninterrupted high voltage steel tower line in the world. Construction work on the Coulee-Covington line was begun in July 1941. Total cost was $3,599,000.

Price Reductions Announced On Fluorescent Lamps

Price reductions ranging from 12 to 17% on Mazda fluorescent lamps effective Sept. 1 have been announced by General Electric's lamp department and the Westinghouse Lamp Co. New manufacturing economies, recent technical developments and increasing use of these lamps in war industries are cited as the reasons for the price reductions.

At the same time prices were reduced on 40, 50 and 60-watt household type filament Mazda lamps from 13c to 10c. Other types reduced include Mazda H (mercury) lamps.

Price changes on fluorescent lamps follow: 14-watt T-12 from 80c to 70c; 15-watt T-8 from 65c to 57c; 15-watt T-12 from 80c to 70c; 20-watt T-12 from 80c to 70c; 30-watt T-8 from 80c to 70c; 40-watt T-12 from $1.15 to 95c; and 100-watt T-17 from $2.60 to $2.15. These prices refer to the daylight and 3,500° white. Prices were also reduced on soft white and colored Mazda F lamps.

War Industries Take Big Share of Bonneville Power

As Bonneville and Grand Coulee generators carried temporary loads exceeding the rating of the generators in service in the two plants, statistics were released last month showing the disposition of all power marketed by the Bonneville Administration during the first six months of 1942. War industries took the lion's share of the energy generated.

During the first half of 1942 the two plants carried peak loads totaling 468,000 kw. and generated 1,485,399,428 kwh. Eight industrial customers with non-coincidental demands of 356,149 kw. used 1,112,941,932 kwh. or 74.8% of the total generated. They paid $2.342,299 or an average rate of 2.10 mills per kwh. Three privately-owned utilities used 178,591,665 kwh., paying $461,531 or an average of 2.58 mills per kwh. Their total non-coincidental demand was 92,190 kw.

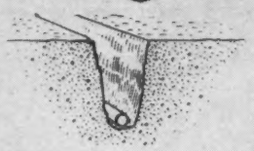
Thirty government and public agencies including municipalities, PUDs, cooperatives and war installations used 50,546,108 kwh. Gross revenues from this group totaled $154,708 and the average rate was 3.06 mills.

● First Issue of a new publication devoted to company news and problems was sent out last month by Portland General Electric Co. Called the *Bullseye* after the circular insignia used by the utility, the new bulletin is edited by Mel Arnold, advertising manager. The August issue, eight pages, was a two-color lithograph job, effectively illustrated.

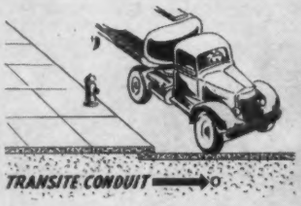
● California Railroad Commission has approved a plan drafted by the California-Oregon Power Co. for reclassification of its common stock and the issuance of $3,500,000 of serial notes for refunding and outstanding issue of debentures.

DO YOU KNOW THESE FACTS ABOUT TRANSITE DUCTS?

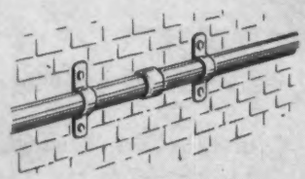
TRANSITE CONDUIT



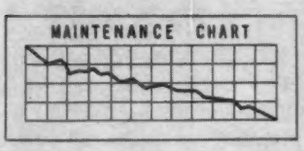
This durable duct is for use underground, or on exposed locations without a protective casing . . .



Under sustained earth loads and traffic pressure, it maintains its strength and true form . . .



Transite Conduit effectively resists weather, smoke and fumes...is virtually unaffected by corrosive soils...



Its cost is low and, in service, it is much more economical than other materials of comparable strength and durability.

. . . In addition, both Transite Conduit and Transite Korduct have these characteristics . . .

1. Incombustible—Made of asbestos and cement, they cannot burn . . . will not contribute to the formation of dangerous smoke, fumes or gases.

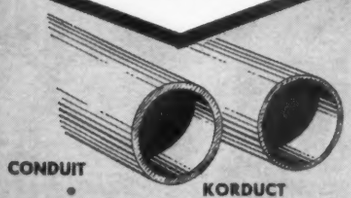
2. Immune to electrolysis . . .Transite Ducts are non-metallic and inorganic . . . unaffected by electrolysis.

3. Smooth bore—Making cable pulls easier, both at initial installation and after years of service.

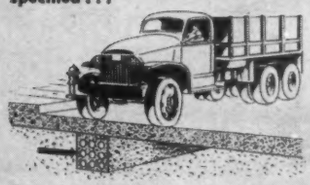
4. Easily installed—Lining up is fast and accurate because Transite Ducts combine light weight, long lengths, simple assembly.

For details and specifications, write for Data Book DS-410. Johns-Manville at Los Angeles, San Francisco or Seattle.

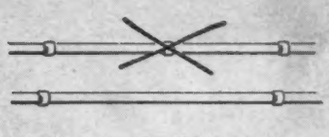
TRANSITE KORDUCT



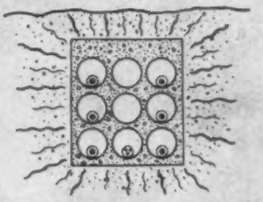
Thinner walled, lower priced than Transite Conduit, Transite Korduct is for use where an encasement is specified . . .



Because Korduct is incombustible, less concrete is required between ducts to provide the necessary degree of fire protection.



Its long lengths (10 feet) mean fewer joints, reducing the number of spacers required . . .



Its high rate of heat dissipation lowers cable operating temperatures . . . increases system capacity . . .

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PORTLAND "BLITZED" BY HEAVY ELECTRICAL STORM

Blitz hit Portland in the early morning of August 3 with a violence that caused air raid wardens to hurry out of bed; reach for their helmets and gas masks. But it was not the "blitz" they thought it was—merely Portland's worst electrical storm in the memory of old timers. Lightning struck trees, houses, a church, bridges, streetcars, power wires in a way never thought possible by the residents of that generally meteorologically quiet city. Several fires were started, but damage on the whole was lighter than at first supposed.

C. P. Osborne, general superintendent, Portland General Electric Co., who day before celebrated his 40th year in the service of that company, stated that it was the worst storm in his experience. Nearly all the 57,000-volt lines of the company in its entire service area were out of service at one time or another during the several hours of the storm's duration. Thirty 11,000-volt distribution lines were put out of service, and a number of oil switches were blown up. No large transformers were lost.

O. L. LeFever, general superintendent, Northwestern Electric Co., reported the blowing of many line fuses, loss of a few disconnecting switches and several distribution transformers, but no serious losses of large equipment such as might have been expected from a storm of this intensity and duration.

Berkey Electric Fish Screen Installed by Sierra Pacific

Sierra Pacific Power Co. has installed a Berkey electric fish screen at the intake of one of its Truckee River power plants for the purpose of keeping game fish from entering the hydraulic works. The installation is the first of its kind on the company system.

The screen consists of a series of electrodes extending over a 50-ft. width and to a depth of 11 ft. Fish are kept from entering the power works by electric impulses which are effective 15 ft. distant from the screen.

The installation is being observed by officials of the Nevada Fish and Game Commission, which have been interested in finding an effective way of keeping game fish out of power and irrigation ditches.

● BIDS WERE TAKEN Aug. 5 for the construction of a 65-mile, 69-kv. single-circuit wood pole transmission line from the Parker power house on the Colorado River at Bagdad Mine, Arizona. Power will be used for the production of copper in a new 2,500-ton concentrating plant.

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TRADE notes

● TRI-STATE SUPPLY CO., factory representatives covering California, Nevada and Arizona for a number of electrical manufacturers, has moved its San Francisco headquarters to 554 Bryant St., where larger quarters and larger warehousing facilities will simplify and expedite operations according to Max B. Wilson, San Francisco manager.

Products of the following manufacturers will be available from the new headquarters: Essex Wire Corp. (magnet wire only); Ohio Carbon Co.; Crescent Insulated Wire & Cable Co. (all products except magnet wire); Steelduct Co.; Taylor Fibre Co.; Homer Commutator Corp.; Mica Co. of New York; New Jersey Wood Finishing Co.; Elizabeth Webbing Mills; P. D. George Co.; Bunting Brass & Bronze Co. and Chicago Transformer Co.

● THERMADOR ELECTRICAL MFG. CO., of Los Angeles has announced its purchase of machinery, dies, equipment and inventory of the Inca Mfg. Division at Los Angeles of Phelps Dodge Copper Products Corp. Purchase arranged by Harry H. Fogwell, president and William C. Cranston, vice-president of Thermador. The company reported that it would be ready to serve industry with priority products of small transformers, solenoids and allied products about Sept. 1.

● J. M. CAVANAUGH AGENCIES, Portland, has been appointed to represent Federal Electric Products Co. of Newark, N. J., for its line of switches and panels. This agency recently moved to new offices at 121 NW Fifth Ave., Portland, following 18 years at 131 SW Fourth Ave. in that city. Other lines represented include Pass & Seymour, Goodrich Electric, La Salle Lighting Products, S. H. Couch Co., Armstrong Products, Cannon Electric Development Co.

● LEO. J. MEYBERG CO. on Sept. 1, took over the business and stock of Standard Electric Supply Co., Los Angeles. Stock was transferred to its own warehouse and showroom at 2027 S. Figueroa St. Some of the personnel of the supply company will continue with the Meyberg organization, which has entered the electrical supply field to offset its merchandise business.

● FRESNO APPLIANCE STORE, formerly at 1344 Fulton St., Fresno, has moved to 223 Weldon St.

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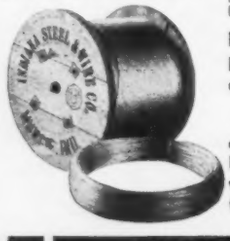

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Joe Newitt, Philosopher, Dies at Los Angeles

Joe Newitt, philosopher-secretary of the Los Angeles Chapter, National Electrical Contractors Assn., since 1935, passed away following a month or more illness, July 28, aged 62. Not the dynamic type, Joseph James Newitt, accomplished by diplomacy, philosophy, patience and human insight what others drive to attain. Born in Kansas the year his father moved the family from England, Joe attended schools in Buena Vista, Colorado, read law in his father's office, became accountant for Colorado Milling Co., and from there worked for Denver Gas & Electric Co. in Denver and other H. L. Doherty properties in Beatrice, Neb., and Pueblo.

In 1916 he transferred to Douglas Traction & Light, in 1921 to Pueblo Flour Mills and in 1927 went to Los Angeles where he was auditor for Doran Electric Co. In 1935 he was made executive secretary of the Los Angeles contractors organization, served for it on industry committees, steered it free of legal entanglements with caution, weathered its ups and downs, gave sage advice and human counsel, until he became an institution in the industry. Crippled in one leg, Joe always took things easy, it became his way of life, his method of operation.

In the industry in Los Angeles his loss is not so easily taken.

● FRED K. CANNON, manager Pacific Coast division of Stromberg Carlson Co., San Francisco, died July 23, at his Berkeley home. Graduate of University of Minnesota in electrical engineering, he had been with Stromberg Carlson for 38 years, the past ten of which were spent in the West. He was active in the Independent Pioneers Telephone Assn.

● F. A. CALMUS, Pacific Coast manager of the Elliott Co., died suddenly in San Francisco on Aug. 2. A graduate in electrical engineering from Iowa State College, Ames, he had spent his entire business career with the Elliott organization. Prior to coming to the Coast 12 years ago, Calmus had been manager of the Kansas City office. He was a member of both the AIEE and ASME.

● ROBERT CAMERON, aged 46, died of heart attack July 15, in San Mateo. He had been factory representative for northern California for Bendix washers but with the cessation of appliance manufacture had gone into real estate.

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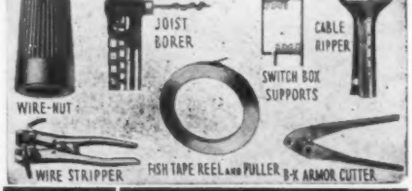

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Sierra Pacific Power Names Tracy President

Election of Frank A. Tracy to succeed H. A. Lemmon as president of Sierra Pacific Power Co., at Reno, was announced in August by the company's board of directors. Tracy has been associated with the electric industry for 23 years, most recently as manager of the Nevada company.

He received his engineering degree from the University of Maine in 1919 and following that went to work for Stone and Webster in the statistical department at Boston. His next job was as assistant superintendent of distribution for the Ponce Electric Co. in Ponce, Puerto Rico, where he remained two years.

TRACY

From Puerto Rico he went to Pawtucket, R. I., where he spent 12 years, serving in various capacities including assistant chief engineer and later assistant to the president.

Next he was connected with Stone and Webster Service Corp. in New York City, first as head of the rates and analysis department and then as personnel director. In 1940 he was named assistant manager of Sierra Pacific Power Co. and later he became manager.

● WILBUR R. FOSTER, commercial representative, Washington Water Power Co., Pullman, died July 29, aged 41, on the eve of taking a new position as associate industrial specialist with the War Production Board. For 10 of his 20 years with the company he had been local manager at Kamiah and Troy. Lately he played a major role in forming a pool of Pullman shops, known as Pullman-Northwest, Inc., to handle war production contracts.

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R. R. Robley Promoted By Portland Utility

R. R. Robley, veteran utility employee has been appointed assistant to President James H. Polhemus of the Portland General Electric Co. Robley for two years had been assistant to Vice-President George E. Sullivan. With his new post he takes over many duties previously carried by Captain Frank M. Warren, Jr., who left recently to join the transport division of the United States army's supply service. Warren was assistant to the president until March of this year, when he was elected vice-president.

The present promotion for Robley climaxes 38 years' service with Portland General Electric. Robley was graduated from the University of Oregon in electrical engineering in 1901, and worked briefly in California and Washington.

Fred R. Groch has been appointed assistant to the vice-president to succeed Robley. He was associated with Prof. F. O. McMillan of Oregon State College in a rate study for the company in 1940, on completion of which he remained in the company's statistical department. A graduate of California Institute of Technology in 1924, he was associated with electric utility companies in California prior to joining the Portland company.

● J. A. CORLETT has been advanced by General Electric Co. to the position of Pacific District publicity representative, with headquarters at San Francisco. In his new job he will collect, prepare and disseminate information on the application and performance of G.-E apparatus, covering the states of California, Arizona and part of Nevada. He will be assisted in Southern California and Arizona by A. X. Schilling. Schilling will be headquartered in Los Angeles, where Corlett formerly was located.

● HUGO E. BECKER, Pacific Coast sales engineer for Westinghouse since 1925, has been appointed supervisor for the district of the newly created maintenance sales department. The department will coordinate the work of three major maintenance divisions of the company—renewal parts, field engineering and repair parts. Becker's territory includes the area west of the Rocky Mts. from the Canadian Border to Mexico. His headquarters will be in San Francisco

● M. A. WOOD, for 15 years chief clerk of the San Luis Obispo district, Pacific Gas and Electric Co. has been made district manager, succeeding the late Charles J. Kelley. A Stanford graduate, Wood started with the San Joaquin Light & Power Co. at Merced in 1923 and was transferred to San Luis Obispo in 1927. Ray Sirman, chief clerk at Los Banos, was transferred to San Luis Obispo as chief clerk and E. F. Reynolds of Merced to Los Banos, according to E. P. Smith, assistant to the vice-president.

ROBLEY

● R. E. POWERS has been named by Westinghouse Electric & Mfg. Co. to succeed E. Nott as Pacific Coast district manager of its manufacturing and repair department. Nott has been granted a leave of absence due to illness.

A native of Washington, Powers had managed the company's Northwestern district manufacturing and repair department for four years. He formerly served Westinghouse at East Pittsburgh and New York and holds patents on various types of electrical apparatus, including transformers, generators, relays and reactors.

● WARREN PENN, manager of Gold Seal Industries, Inc., at Glendale, a project involving the sale of adequate wiring to homebuilders in which the electrical contractors association was the moving force, has been selected by the Los Angeles Chapter, National Electrical Contractors Assn. as executive secretary to succeed the late J. J. Newitt, who died July 28.

● W. L. WINTER has been assigned by Westinghouse Electric & Mfg. Co. to the Pacific Coast District headquarters at San Francisco as sales engineer for the company's central station and transportation divisions. He has been a sales engineer for Westinghouse at Salt Lake City for the past nine years.

New WPB Officials Former Bonneville Men

Herbert S. Marks, new director of the WPB power branch succeeding J. A. Krug, and Barclay Sickler, newly appointed deputy director, are both former Bonneville Power Administration officials. Marks was Bonneville's first general counsel, while Sickler is on leave of absence from the BPA as its chief of the rates and statistics division.

Marks came to Bonneville originally from the legal staff of the Tennessee Valley Authority. He is a graduate of Harvard Law School and all of his experience has been with government departments or agencies.

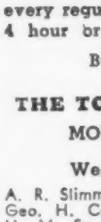
Sickler was on the staff of the Wisconsin Public Service Commission prior to coming to Bonneville. He has been in Washington with the WPB since early 1941, first as head of the research and statistics units of the power division and more recently as chief of the priorities section.

● ANACONDA WIRE & CABLE CO. recently announced the following changes in the Los Angeles and San Francisco sales districts:

Lee M. Lethine, district manager of the San Francisco territory, has been promoted to head of Anaconda's sales activities in southern California, Arizona and southern Nevada. Lethine had been associated with the electrical industry for 14 years in the San Francisco and Bay area regions.

R. L. Hayward, assistant to Lethine at San Francisco, has been named district manager of the territory. Formerly in Anaconda's Seattle district, Hayward was transferred to San Francisco in 1940.

TORK CLOCKS



THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

NOW—lower prices and higher capacities

There is a Tork Clock for every regular switching job; 60 minute, 4 hour or daily cycles.

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SAFLEX

(LOW REACTANCE) FEEDER DUCT

✔ Only 1.8 Volts drop per 100 feet
✔ Phases balanced at all points
✔ Only 38° C. temperature rise

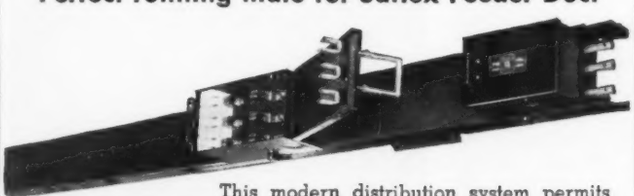
Square D Saflex (Low Reactance) Feeder Duct is designed to serve as the feeder between transformer banks and main switchboard or as feeders to branch circuits where minimum voltage loss is essential. Because of its low reactance and consequent low voltage drop, it is ideally suited for welder circuits and, as a result, conductor size may be kept at a minimum.

The special non-critical insulation of Saflex Feeder Duct also constitutes approximately 80% of its housing, thus eliminating large use of vital war materials such as steel. Saflex Duct is available in standard 10-foot sections with special fittings to meet all types of building structures.

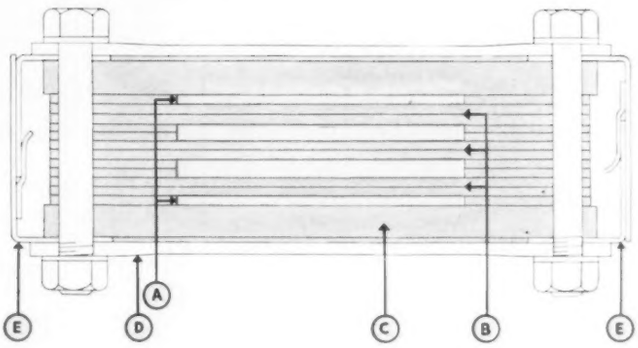
Let a Square D Field Engineer give you the complete story.

SAFLEX PLUG-IN DUCT

Perfect running mate for Saflex Feeder Duct



This modern distribution system permits plugging in machines just as you would appliances at home. Busses are rigidly supported, round copper bars and tubes with expansion couplings every ten feet. Units are easily attached and disconnected. 100% salvage value for re-use. 2, 3 and 4 wire services, 600 Volts or less.



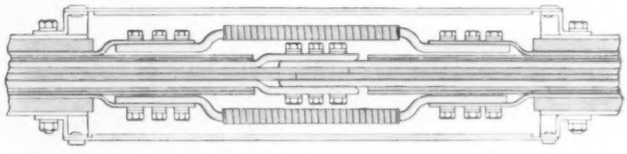
A Split Bus. Assures uniform and low voltage drop because it provides close spacing and electrical symmetry of phases.

B ¼" Insulated Space between opposite busses also helps to keep voltage losses at a minimum.

C Special Insulation totally encloses busses. Has high mechanical and dielectric strength, is impervious to moisture and resistant to an arc. Conducts heat readily and thus insures low temperature rise.

D Surge Clamps every 24 inches give structural and mechanical strength to withstand 50,000 amperes short circuit with a substantial factor of safety.

E Steel Channels at top and bottom complete the housing which totally encloses the busbars.



Connection between Bus Sections *(top view)*
Note that all bolts for joints face outward and are accessible through hand hole openings which provide ample working space. Steel cover plates over hand holes are easily and quickly removed.

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LOS ANGELES - DETROIT - MILWAUKEE

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PROFILES *of the month*

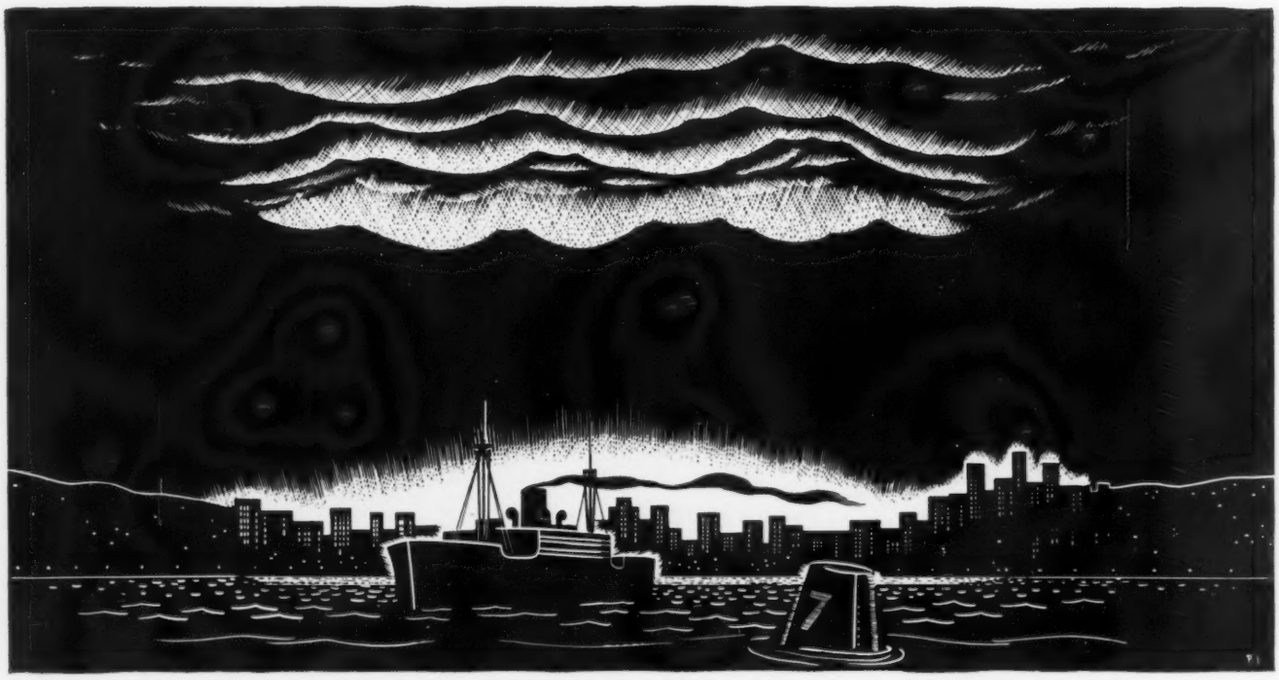
Harold L. Moore (right) recently appointed Pomona district manager by Southern California Edison Co. to succeed Hale Kemp, now in the Air Corps

C. T. Bakeman, industrial and commercial lighting director for the Puget Sound Power & Light Co., Seattle, for the past 15 years has been appointed assistant director of the Northwest Sector of the Office of Civilian Defense. He will work directly with Stanley Donogh, OCD ditor and will direct the dimout of the Washington and Oregon coasts. Bakeman will continue in his present activity with the power Company, which voluntarily offered its cooperation with the OCD in allowing him to give as much of his time as required to the public work

Roy H. Skill, Pacific Power & Light Co. manager at Pasco, Wash. since 1927, receives his 25-year service pin from D. F. McCurrach, assistant general manager of the company, Skill started with Pacific in 1917 on a construction job

W. P. L' Hommedieu, (right) Pacific Coast district manager, Transportation and Central Station departments for Westinghouse Electric & Mfg. Co., is greeted by C. F. Lloyd at the recent meeting of the company's central station managers at East Pittsburgh, Penn.

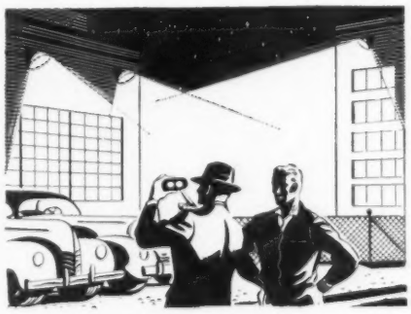
Earl O. Shreve, G-E vice-president (left) on a trip to the West last month visits with R. M. Alvord, commercial vice-president, in his office at San Francisco. Shreve spent 19 years in the west; was located at San Francisco from 1909 to 1926, the last nine years as manager



Skyglow must be stopped!

Let P. G. and E. lighting specialists help you with your dim-out problems

THE JOB of installing visors, louvers, shades, shields and otherwise eliminating *upward light* as required in Proclamation 10 is frequently quite complicated and technical. In view of this fact, P. G. and E. has assigned virtually its entire staff of Lighting Specialists to serve as *"dim-out specialists";* to work closely with local Civilian Defense authorities, and to show customers not only what is wanted, but how to get the desired results as quickly and as inexpensively as possible.



Call on these men as you always have *through any P. G. and E. office.* If you expect to need a light meter test, see us soon for we have only a limited number of instruments and expect to receive a great many calls for tests.

Needless to say, this dim-out advisory service is entirely a company contribution to the war effort and costs you nothing. Get busy...now...and see that *your* lighting complies 100%. The official date for compliance is *already past!*

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